Order Number: MMCD020801C8

Service Manual

Digital Cellular Phone

EB-GD67

GSM

	900 MHz	1800 MHz
Frequency Range	Tx: 880 - 915MHz Rx: 925 - 960 MHz	Tx: 1710 -1785 MHz Rx: 1805 -1880 MHz
Tx/Rx frequency separation	45 MHz	95 MHz
RF Channel Bandwidth	200 kHz	
Number of RF channels	174	374
Speech coding	Full rate/Half rate/Enhanced Full rate	
Operating temperature	-10 °C to +55 °C	
Type	Class 4 Handheld	Class 1 Handheld
RF Output Power	2 W maximum	1 W maximum
Modulation	GMSK (BT = 0.3)	
Connection	8 ch / TDMA	
Voice digitizing	13 kbps RPE-LTP / 13 kps ACLEP / 5.6 kps CELP / VSLEP	
Transmission speed	270.833 kbps	
Signal Reception	Direct conversion	
Antenna Impedance (External Connector)	50 Ω	
Antenna VSWR	< 2.1 : 1	
Dimensions	Height: 109 mm Width: 45 mm Depth: 20 mm	
Volume	81 cc	
Weight	81 g	
Display	Graphical chip on glass liquid crystal, Alphanumeric, 101 x 80 pixels, 256-colour palette (RGB).	
Illumination	8 LEDs for Keypad Backlighting (Green) 1 LED for LCD Backklighting (White) 2 LEDs for Incoming call (Green) and Charging (Red)	
Keys	16-key Keypad, Navigation key.	
SIM	3 V Plug-in type only	
External DC Supply Voltage	5.8 V	
Battery	3.7 V nominal, 690mAh, Li-Ion	
Standby Time	60 - 190 hrs	
Talk Time	1.5 - 6.5 hrs	

Talk and standby time will be dependent on network conditions, SIM card, backlight usage and network condition.

WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service manual by anyone else could result in serious injury or death.

Panasonic®

Issue 1
Revision 0

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Every care has been taken to ensure that the contents of this manual give an accurate representation of the equipment. However, Matsushita Mobile Communications Development of Europe Ltd. accepts no responsibility for inaccuracies which may occur and reserves the right to make changes to the specification or design without prior notice.

Other patents applying to material contained in this publication:

CP8 PATENTS

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CONTENTS

1 INTRODUCTION

WARNING

The equipment described in this manual contains polarised capacitors utilising liquid electrolyte. These devices are entirely safe provided that neither a short-circuit or a reverse polarity connection is made across the capacitor terminals. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN DAMAGE TO THE EQUIPMENT OR, AT WORST, POSSIBLE INJURY TO PERSONNEL RESULTING FROM ELECTRIC SHOCK OR THE AFFECTED CAPACITOR EXPLODING. EXTREME CARE MUST BE EXERCISED AT ALL TIMES WHEN HANDLING THESE DEVICES.

Caution

The equipment described in this manual contains devices sensitive to electrostatic discharge (ESD). Damage can occur to these devices if the handling procedures described in Section 4 are not adhered to.

Caution

This equipment contains an internal battery in addition to the external battery packs. These batteries are recyclable and should be disposed of in accordance with local legislation. They must not be incinerated, or disposed of as ordinary rubbish.

Caution

The equipment uses a Printed Circuit Board PCB manufactured using Lead Free (PbF) solder. The procedures described in Section 6 should be adhered to when repairing these items.

1.1. Purpose of this Manual

This Service Manual contains the information and procedures required for installing, operating and servicing the Panasonic GSM Personal Cellular Mobile Telephone system operating on GSM Digital Cellular Networks.

1.2. Structure of the Manual

The manual is structured to provide service engineering personnel with the following information and procedures:

1. General and technical information - provides a basic understanding of the equipment, kits and options, together with detailed information for each of the major component parts.
2. Installation and operating information - provides instructions for unpacking, installing and operating the equipment.
3. Servicing information - provides complete instructions for the testing, disassembly, repair and reassembly of each major component part. Step-by-step troubleshooting information is given to enable the isolation and identification of a malfunction, and thus determine what corrective action should be taken. The test information enables verification of the integrity of the equipment after any remedial action has been carried out.
4. Illustrated parts list - provided to enable the identification of all equipment components, for the ordering of spare / replacement parts.

1.3. Servicing Responsibilities

The procedures described in this manual must be performed by qualified service engineering personnel, at an authorised service centre.

The service engineering personnel are responsible for fault diagnosis and repair of all equipment described in this manual.

2 GENERAL DESCRIPTION

2.1. General

This section provides a general description and kit composition details for the Digital Cellular Phone and optional kits.

2.2. Features

The Panasonic Phone Model GD67 is a high performance, small, light, telephone handset for business and domestic use on General Packet Radio Service (GPRS) running on GSM networks. The following features are provided:

- Triple Rate, which includes Full Rate, Half rate and Enhanced Full Rate (EFR) speech, codec.
- Dual Band, E-GSM 900 and GSM 1800 operation.
- GPRS-compatible (Class 8).
- 256-colour Liquid Crystal Display.
- Enhanced Message Service (EMS).
- Tegic T9 Text Entry.
- Voice Ringer.
- Wireless Application Protocol (WAP) Browser.
- Backup Battery.
- 16-voice polyphonic ringtones.
- Downloadable polyphonic melody ring tones.
- Clock, Calculator and Currency Converter.
- Changeable Inlay Card for Case Back.

2.3. Telephone Handset Main Kit

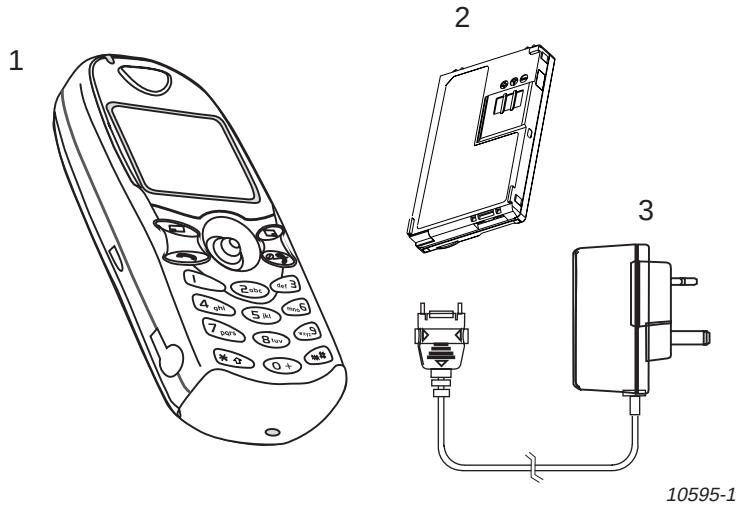


Figure 2.1: Telephone Handset Main Unit Kit Contents

ITEM	DESCRIPTION	PART NUMBER
1	Main Unit	EB-GD67
2	Battery, Standard	EB-BSD67
3	Travel Charger	EB-CAD95
-	Inlay Card Template	See Section 9
-	Document Pack	See Section 9.

3 OPERATING INSTRUCTIONS

3.1. General

This section provides a brief guide to the operation and facilities available on the telephone handset. Refer to the Operating Instructions supplied with the telephone for full operational information.

3.2. Liquid Crystal Display

The telephone handset has a graphical chip on glass display.

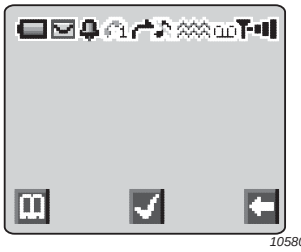


Figure 3.1: Liquid Crystal Display

The following icons are available:

	Indicates GSM signal strength: strong signal area; weak signal area.
	Indicates GPRS signal strength: strong signal area; weak signal area.
	Indicates that it is possible to make an emergency call.
Menu Number	The number of the feature indicated by the pointer. To access a feature enter the menu number on the keypad.
	Displays the battery charge level: Battery is at full charge Battery requires charging. The battery icon scrolls during charging.
Menu Icon	Displays a small icon related to the current status of the telephone: △ telephone is roaming on a non-home network. using the “Call Divert” feature or the telephone has Call-Divert set; shows that vibration alert is switched on; shows that the telephone is in silent mode. flashes to indicate that there are unread text (SMS) messages. Lit when SMS area is full; O indicates the telephone is locked; ABC shows that the normal character set has been selected; ABΓ shows that the Greek character set has been selected; AÄÅ shows that the Extended character set has been selected; 0–9 shows that numbers have been selected for text entry T9 indicates that Tegic T9® predictive text mode is selected.
Information Icon	Displays a small icon according to the current menu level: ? indicates the alarm is set. > indicates the current Phonebook is sourced from the Mobile Phonebook. < indicates the current Phonebook is sourced from the SIM Phonebook.
	Indicates that the navigation key ( ) can be pressed. Each arrow will light individually to indicate which direction is valid.
Option Area	Pressing the select key ( ) will select the option displayed in the option area of the display.

Following some operations, the display will clear automatically after three seconds or after pressing any key except .

3.3. Location of Controls

Incoming / Charge indicator:
Green - Incoming call.
Red - Charging battery pack.

External connector:
Used to connect to external accessories or to charging equipment.

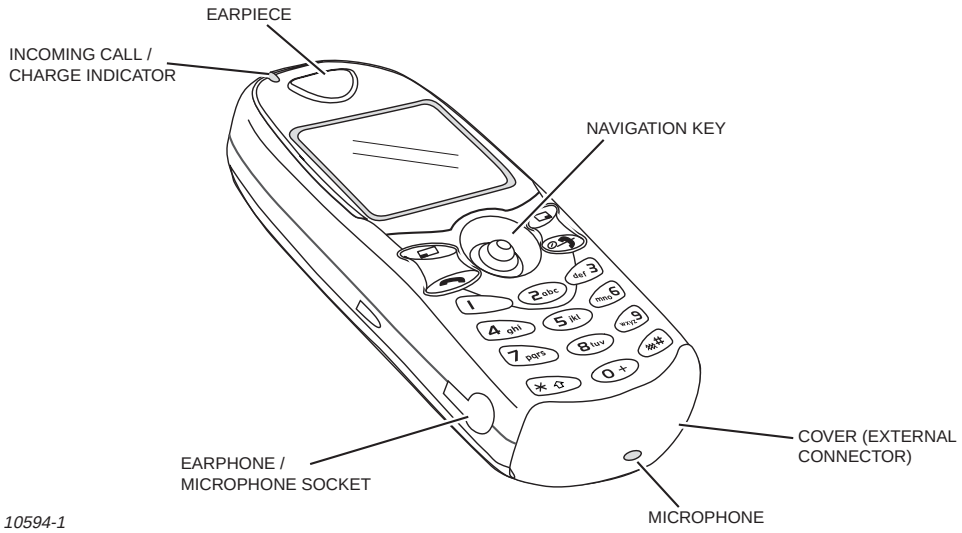


Figure 3.2: Location of Controls

	Navigation Key. Scrolls through options or features menu and increases or decreases volume.
	Cancel Key. Used mainly to cancel the current operation and return to the previous menu level. In some menus it has other functions.
	Option key. Primarily used for accessing the Phonebook or switching character types.
	Send Key. Makes a call.
	End Key. Ends a call or switches the telephone on/off when pressed and held.
0 + to 9 WXYZ	Digit keys. Enter wild numbers or pauses when pressed and held. Where appropriate the 0 + key scrolls up or down through abbreviated control names and then select to reveal the international access code “+”.
#	Vibrate enable/disable Key. Press and hold to enable or disable the vibrate alert.

3.4. Concept of Operation

There is a close relationship between the Select keys, Navigation key and display.

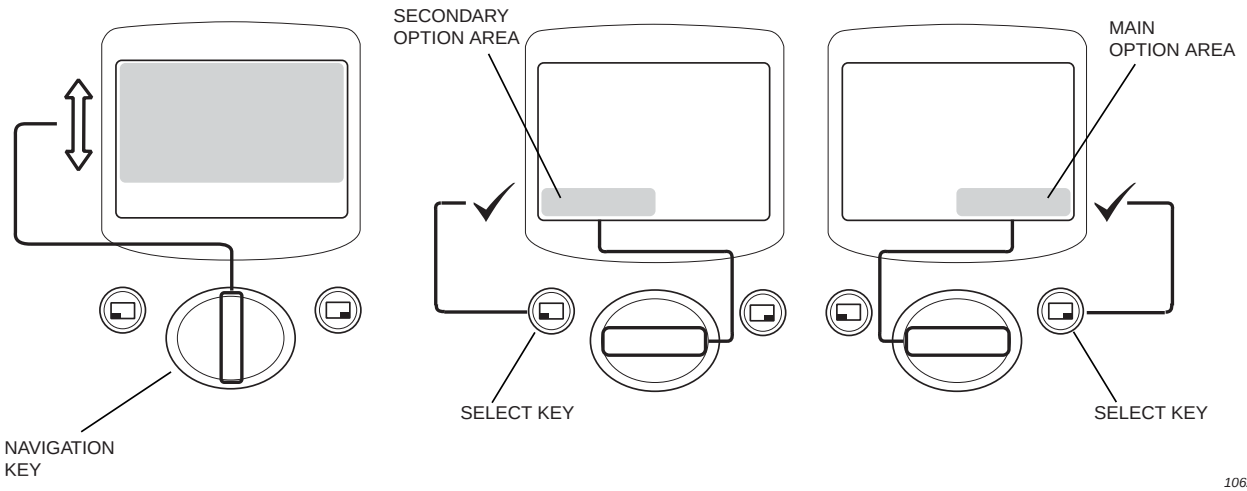


Figure 3.3: Concept of Operation

Pressing up and down (▲▼) will move the pointer up and down and scroll through more information in the main area of the display.

Pressing left and right (◄►) will scroll through options in both option areas of the display. To choose the required option, press the corresponding Select Key (⊡).

3.5. Alpha Entry

3.5.1 Character Set / Key Assignments

Alpha entry is used to enter alphanumeric characters in to the Phonebook, Short Messages and Greeting Message areas

Key		Character / Operation			
	T9®	Normal	Greek	Extended	Numeric
0+	Alternatives	+ -	+ -	+ -	0+P_
1	Punctuation	" @ – , . ; : ! ¡ ? ¿ ( ) ' & % + – / < > = £ $ ¥ ¤ §			1
2 ABC	abc	A B C a b c	Α Β Γ	A Ä Å Æ B C Ç a à b c	2
3 DEF	def	D E F d e f	Δ E Z	D E É F d e è é f	3
4 GHI	ghi	G H I g h i	Η Θ Ι	G H I g h i ì	4
5 JKL	jkl	J K L j k l	Κ Λ Μ	J K L j k l	5
6 MNO	mno	M N O m n o	Ν Ξ Ο	M N Ñ O Ö ø m n ñ o ò ö	6
7 PQRS	pqrs	P Q R S p q r s	Π Ρ Σ	P Q R S p q r s ß	7
8 TUV	tuv	T U V t u v	Τ Υ Φ	T U Ü V t u ù ü v	8
9 WXYZ	wxyz	W X Y Z w x y z	Ξ Ψ Ω	W X Y Z w x y z	9
* ⇧	Shift / Lock	*	*	*	*
#	Space	#	#	#	#

Each time a key is pressed, it will display the next character. When another key is pressed, or no key is pressed for a short time, the cursor will move to the next position.

To cycle between Greek characters (Α Β Γ), extended characters (W), numerals (X) and normal characters (U) press ⊡ .

3.5.2 Editing Alpha Entry

Pressing ▲▼ will move the cursor up or down one line. Pressing ◄► will move the cursor left or right one character. When the cursor is moved over a character and another key pressed this will insert the new character.

Pressing ⌫ will delete the character to the left of the cursor.

3.6. Features Menu Structure

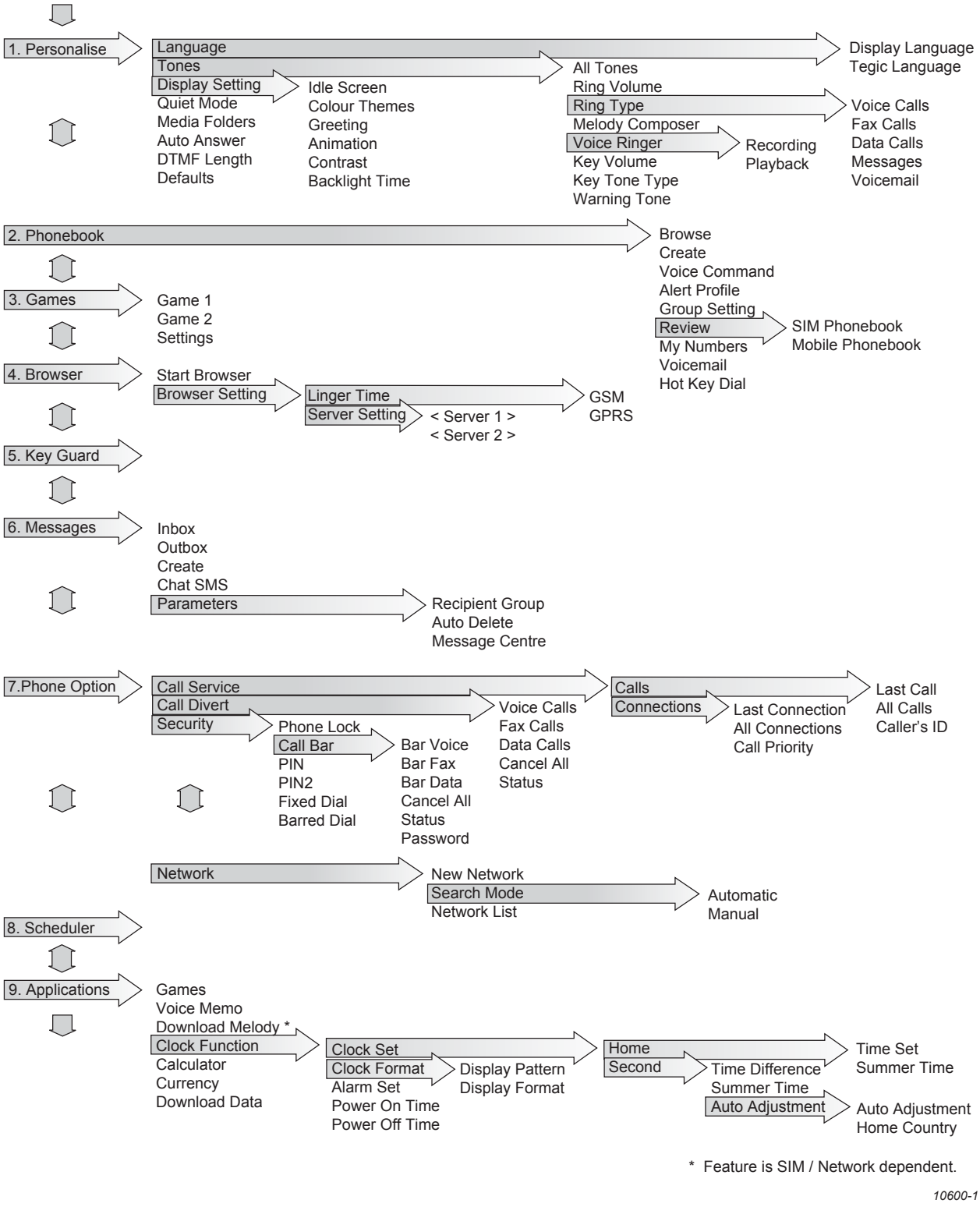


Figure 3.4: Features Menu Structure

4 TECHNICAL DESCRIPTION

4.1. RF Overview

4.1.1 General Specifications

The telephone is a Dual Band product incorporating two switchable transceivers, one for the E-GSM 900 band and another for the GSM 1800 (DCS 1800) band. The transmit and receive bands for the mobile are given in the table below:

	Tx	Rx
E-GSM 900	880-915 MHz	925-960 MHz
GSM 1800	1710-1785 MHz	1805-1880 MHz

Other notable technical features are as follows:

	E-GSM 900	GSM 1800
Rx Bandwidth	35 MHz	75 MHz
Tx Bandwidth	35 MHz	75 MHz
Duplex Spacing	45 MHz	95 MHz
Number of Channels	174	374
AFRCN (Channel Numbers)	0-124 975 - 1023	512-885
1st Tx Channel	880.2 MHz (Ch 975)	1710.2 MHz (Ch 512)
Last Tx Channel	914.8 MHz (Ch 124)	1784.8 MHz (Ch 885)
1st Rx Channel	925.2 MHz (Ch 975)	1805.2 MHz (Ch 512)
Last Rx Channel	959.8 MHz (Ch 124)	1879.8 MHz (Ch 885)
Maximum Tx Power	33.0 dBm (Class 4) (PL5)	30.0 dBm (Class 1) (PL0)
Minimum Tx Power	5.0 dBm (PL19)	0.0 dBm (PL15)

4.1.2 Main PCB Description

All RF components are located on one side of the top half area of the PCB, with the baseband components (Logic circuits) occupying the lower half of the PCB. The RF circuit area is shielded by two metal screens and the Logic circuits area by one screen.

The LCD Module and keypad are mounted on the reverse side of the PCB.

4.2. Transmitter

4.2.1 Functional Description

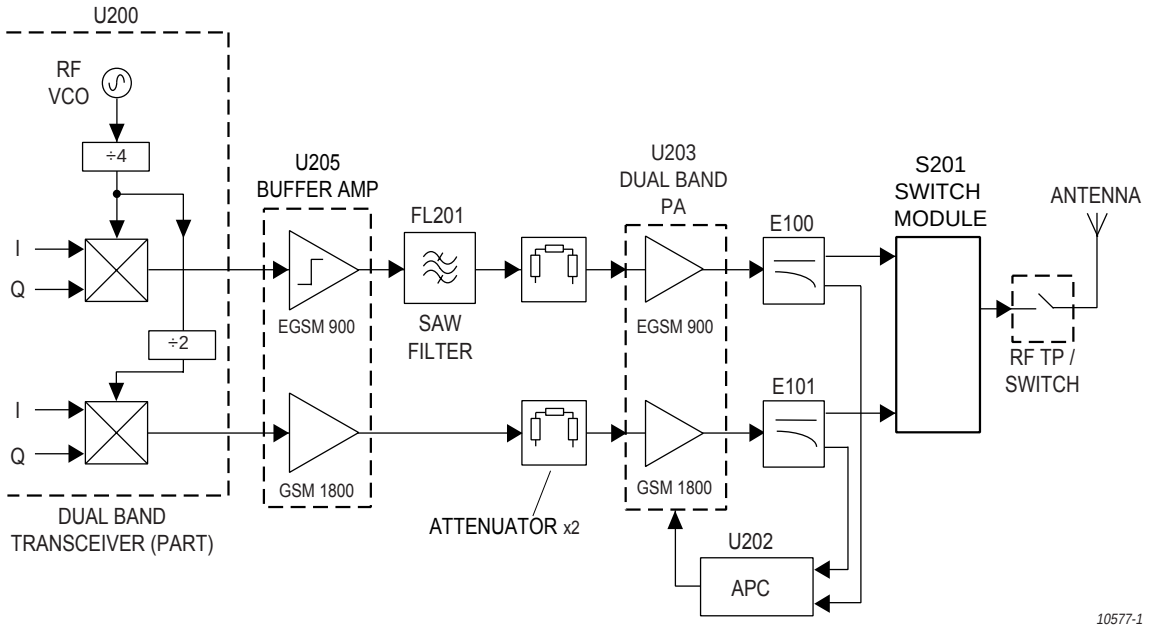


Figure 4.1: Transmitter Block Diagram

The transmitter design is based on an IQ Modulator and operates at Class 4 (2W) in the GSM 900 band and at Class 1 (1W) in the GSM 1800 band. The architecture has been carefully chosen to limit GSM transmitter noise in the receiver band without the requirement for a duplexer.

A dual band transceiver IC (U200) provides the following transmitter functions:

I, Q Quadrature modulator

Down conversion mixer for modulated signal to intermediate frequency.

Phase detector for PLL modulation loop.

The modulator output is fed into dual band buffer amplifier U205 which ensures temperature stability and AM suppression. A three port EGSM SAW filter FL201 filters EGSM 900 output to provide extra filtering against transmitter noise in the receiver band. The selected transmitter band (EGSM 900 or GSM 1800) output signal from U205 is then attenuated and applied to its dedicated input of the dual band Power Amplifier (PA) U203.

Filtering of the transmitter harmonics, most of which are from the PA, is provided by couplers E100 (EGSM 900) and E101 (GSM 1800). The output from the couplers is applied to the antenna switch S201 which provides a connection path to the RF test point CN201 and the internal antenna.

The coupled outputs are combined at the input of U202, an Automatic Power Control (APC) IC, to control the gain and output power of the PA. An RF detector in U202 produces a baseband output which is compared with a control signal from the logic section to produce a control signal for the PA.

4.3. Receiver

4.3.1 Functional Description

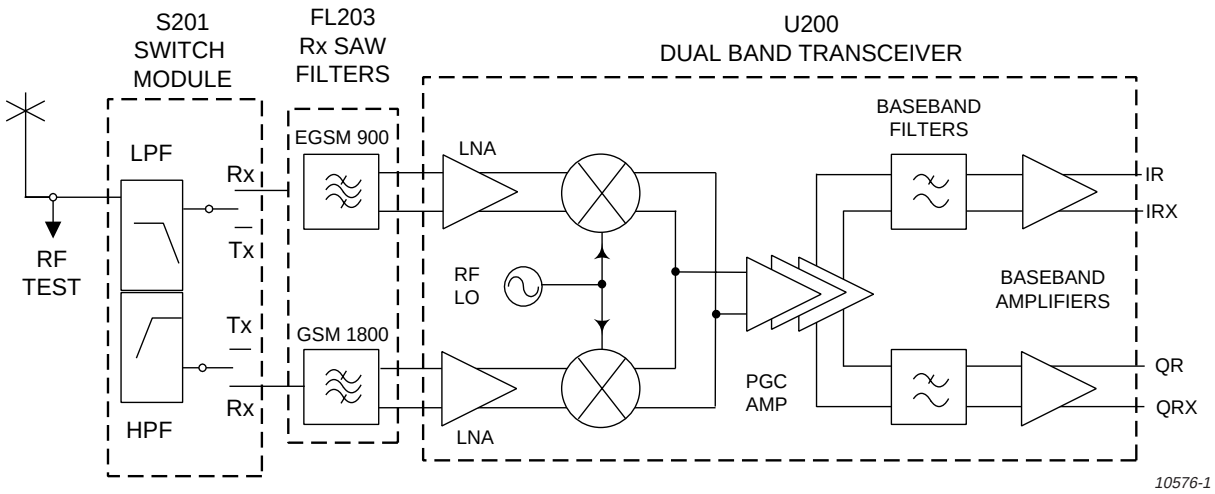


Figure 4.2: Receiver Block Diagram

The main building block for the receiver is the dual band transceiver IC (U200) which includes a direct conversion receiver with I and Q quadrature demodulation.

Received signals from the antenna are passed to the dual band antenna switch module S201. This module contains a diplexer which filters the signal to the required receiver path (E-GSM 900 or GSM 1800). Pin diode switches within S201 route the signal path from the transmitter or to the receiver as required. Output signals from S201 are then applied via the dual band SAW filter FL203 and impedance matching circuits to the balanced Low Noise Amplifiers (LNA) onboard U200.

Output from the LNAs is then converted directly to baseband frequency by a quadrature demodulator mixer. The local oscillator (LO) signal presented to the mixer is provided by an internal VCO and divided by four. The VCO operates over the frequency range 3700.8 MHz - 3839.2 MHz.

At baseband, the GSM signal is passed through a 1-pole blocking filter (comprising two external capacitors) and a channel filter. These filters provide some attenuation to adjacent channel signals at the receiver input, e.g. ±200 kHz, ±400 kHz and ±600 kHz.

These filters are designed to give low group delay ripple, typically 1µs maximum over the temperature range specified for U200, across the GSMK modulation baseband (80 kHz at baseband). An internal equaliser stage is used to correct any group delay variation which causes distortion of the received signal.

The baseband signal is then amplified by nine programmable variable gain amplifier stages within U200 which provide gain settings between -20 dB and +58 dB. The LNA can be programmed to switch on or off, providing a further step gain of 20 dB.

The I and Q baseband signals are then offset to 1.35 V DC produced internally by U200. This offset level provides the largest dynamic range available for the receiver, which is limited by IOTA. IOTA provides A to D conversion of the GSM signal and a further 45 dB attenuation of adjacent channel signals through DSP filtering.

4.4. Baseband Overview

4.4.1 Introduction

The Baseband circuits of the phone are required to perform the following functions:

- Equalisation
- Channel coding / decoding
- Speech coding / decoding
- Data Encryption
- Layer 1, 2 and 3 software tasks
- Man Machine interface (MMI)
- System Interface
- SIM Interface and Management
- Audio and Tone Generation
- Power supply and battery management
- RF power control
- Synchronisation
- Real time clock

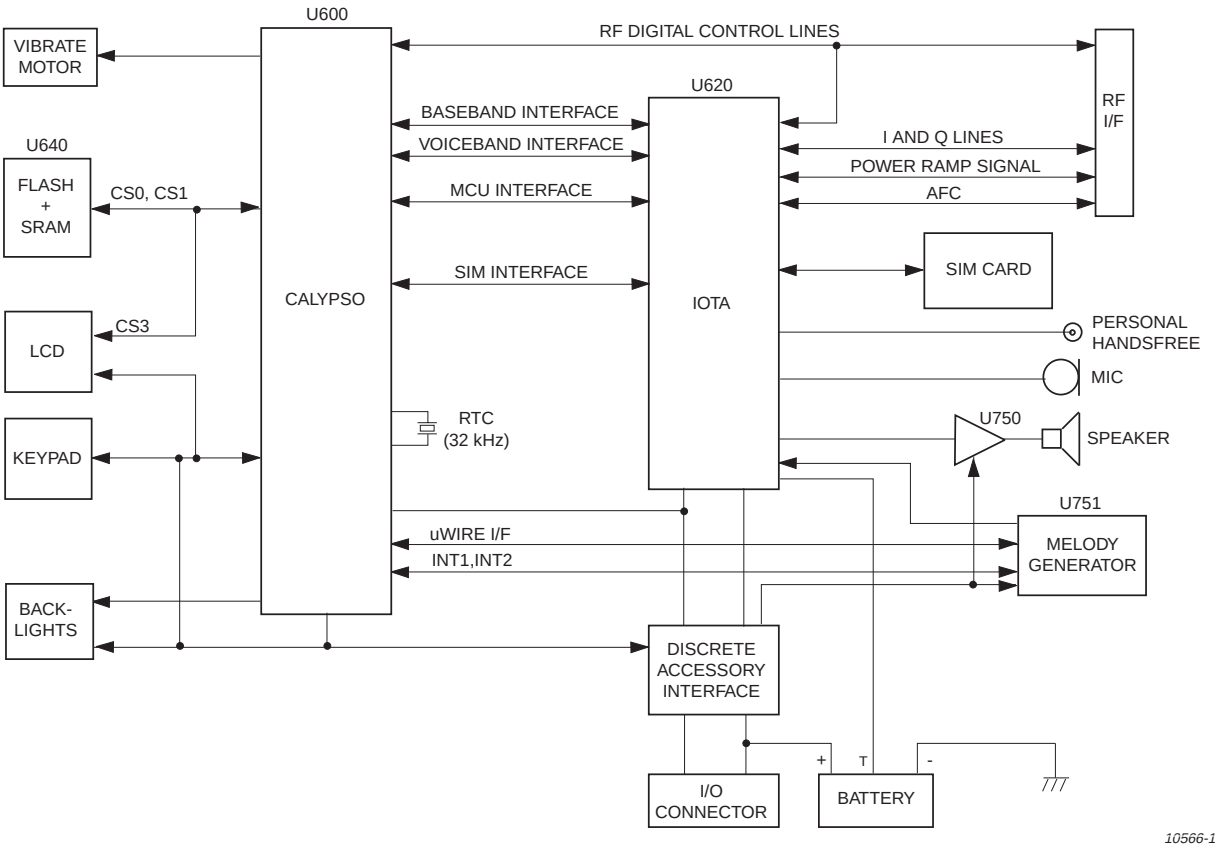


Figure 4.3: Baseband Block Diagram

The GD67 Baseband is built around a GSM chipset developed by Texas Instruments. The chipset comprises two chips, CALYPSO and IOTA. The highly integrated nature of the chips means that each contain a large number of functions. CALYPSO is a signal processing device with DSP and CPU. The DSP performs channel and speech encoder/decoder tasks, together with equalisation and encryption. The CPU runs layer 1, 2, and 3 software, controls the MMI, SIM and system interfaces, real time clock, and battery and power management. CALYPSO also controls IOTA.

IOTA provides frame timing, A/D conversion, RF power control, audio interfacing including tone generation, and baseband power supplies.

4.4.2 Keypad

The Keypad has a 5 x 5 matrix, allowing 25 keys to be scanned. When a key being pressed, a keypad interrupt is generated. To find which key has been pressed, the software scans each column in turn and reads which row is active. Because of key bounce, the key press is confirmed twice at approximately 20 ms intervals.

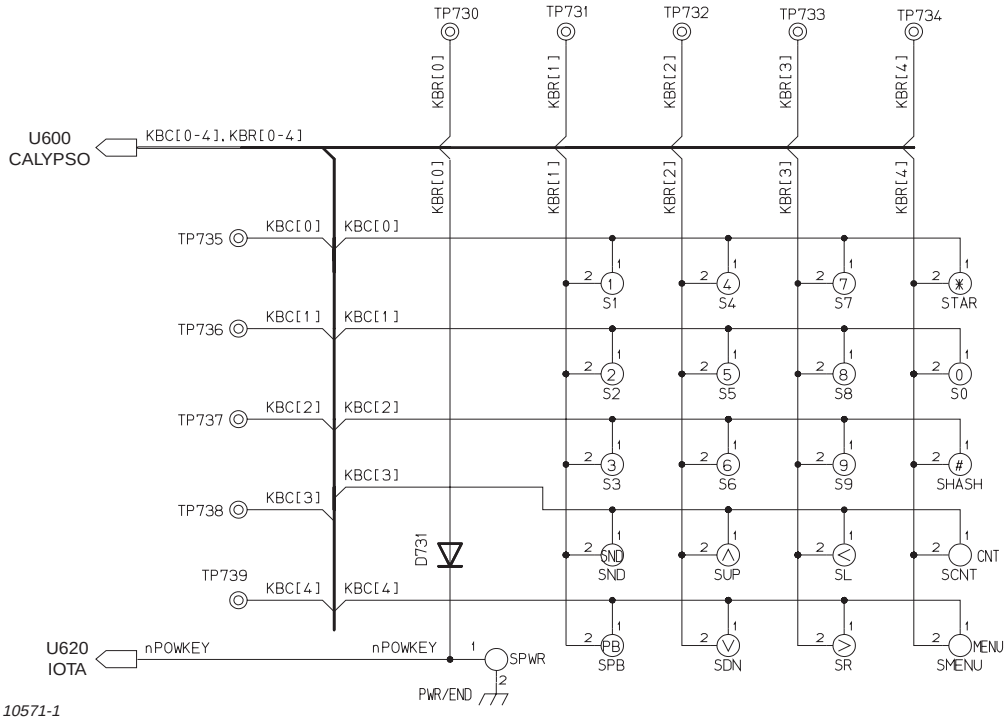


Figure 4.4: Keypad Connections

As the End Key doubles for the ON / OFF key, it is allocated an entire row of the keyboard scan.

Keyboard scanning is controlled by software. ‘Key pressed’ is indicated by an interrupt, but ‘key released’ is monitored by software.

4.4.3 Subscriber Identity Module (SIM)

The SIM interface is designed to support 3 V SIMs. As CALYPSO operates from a 2.8 V supply, level translation from 3 V is provided by IOTA.

4.4.4 TPU

The TPU provides the GSM TPU TDMA timing requirements for the system.

TPU Timing output signal assignments of CALYPSO				
Name	**Ball No.**	**Function**	**Connection**	**Configuration**
TSPACT 0	M12	PAON	External	Used for triggering Measuring Equipment
TSPACT 1	M14	PLLON	RF	
TSPACT 2	L12	NC	N/A	
TSPACT 3	L13	NC	RF	
TSPACT 4	J10	TX_ON1	RF	
TSPACT 5	K11	NC	N/A	
TSPACT 6	K13	DCS_PAON	RF	
TSPACT 7:CLKX_SPI	K12	GSM_PAON	RF	
TSPACT 8:nMREQ	K14	NC	N/A	
TSPACT 9:MAS1	J11	NC	N/A	
TSPACT 10:nWAIT	J12	nWAIT	LCD	Used with RnW
TSPACT 11:MCLK	J13	NC	N/A	

4.4.5 CPU Memory

To reduce component space, the phone memory consists of 64 MB Flash and 8 MB SRAM MCP. Additionally, CALYPSO has 4 MB internal SRAM, thus extending total SRAM to 12MB.

4.4.6 LCD

The LCD module is of a chip on flex (COF) construction.

The display has 101 x 80 pixels, each capable of displaying 256 colours. There is a one-to-one relationship between the internal Graphics RAM (GRAM) and each pixel.

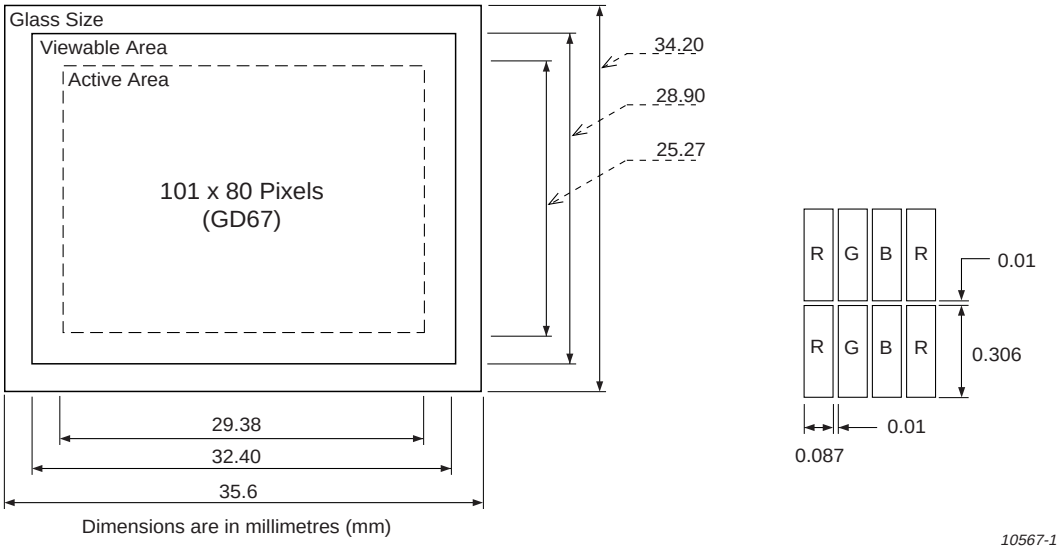


Figure 4.5: LCD Dimensions

The LCD driver is controlled by setting the command register through the CALYPSO u-wire interface and an I/O line which distinguishes between command or data. To send data or a command to the display driver, the nSCS0 line is used for chip select. LCD_CD (I/03) is set high to send data and set low to send commands.

4.4.7 Real Time Clock (RTC)

Clock functions are provided by a Real Time Clock built into CALYPSO. The module is synchronised by a 32.768 kHz crystal and is powered via a dedicated regulator in IOTA and is backed up by a 2.5 V button battery.

CALYPSO has a clock auto compensation function to take into account any inaccuracies of the crystal. It is able to calibrate crystal tolerance / drift by writing to the compensation registers. This calibration can adjust the clock to a resolution of 1 x 32768 Hz clock period.

Registers for RTC are assigned between $FFFE:1800 - $FFFE:1814.

4.4.8 Timers

There is a watchdog timer and two 16 bit general-purpose timers which can be used either as auto reload or one-shot timers to provide interrupts to the ARM CPU. The watchdog timer receives a 928 kHz clock signal from the CALYPSO clock module. A combination of pre-scaler and timer register gives a time range of 1.078 µs to 9.039 s. The general purpose timers receive a 812.5 kHz clock signal.

4.4.9 UART

CALYPSO has two UART ports, UART modem and UART / IrDA. The UART / modem port is used for optional accessories. The UART / IrDA port is used for data connection, software debugging, factory testing and software downloading.

UART / MODEM PORT ASSIGNMENT			
CALYPSO SIGNAL	**PIN No.**	**FUNCTION**	**I/O**
TX_MODEM	B9	UART serial data TX	O
RX_MODEM	A9	UART serial data RX	I
DSR_MODEM	D9	UART Data Terminal Ready	I
RTS_MODEM	E8	UART Clear to Send	O
CTS_MODEM	C9	UART Request to Send	I

Registers for the UARTs are located from $FFFF:5000 to $FFFF:5011 (UART / IrDA) and from $FFFF:5800 to $FFFF:5811 (UART / modem).

4.4.10 Accessory Interface

The phone uses discrete components for the buffering and level shifting at the I/O (Accessory) connector. Interface connections are protected from short circuit currents up to 4.4 mA and a maximum rise time of 1.1µs.

Connection of an accessory will not power up the phone.

4.5. Power Supplies

4.5.1 Introduction

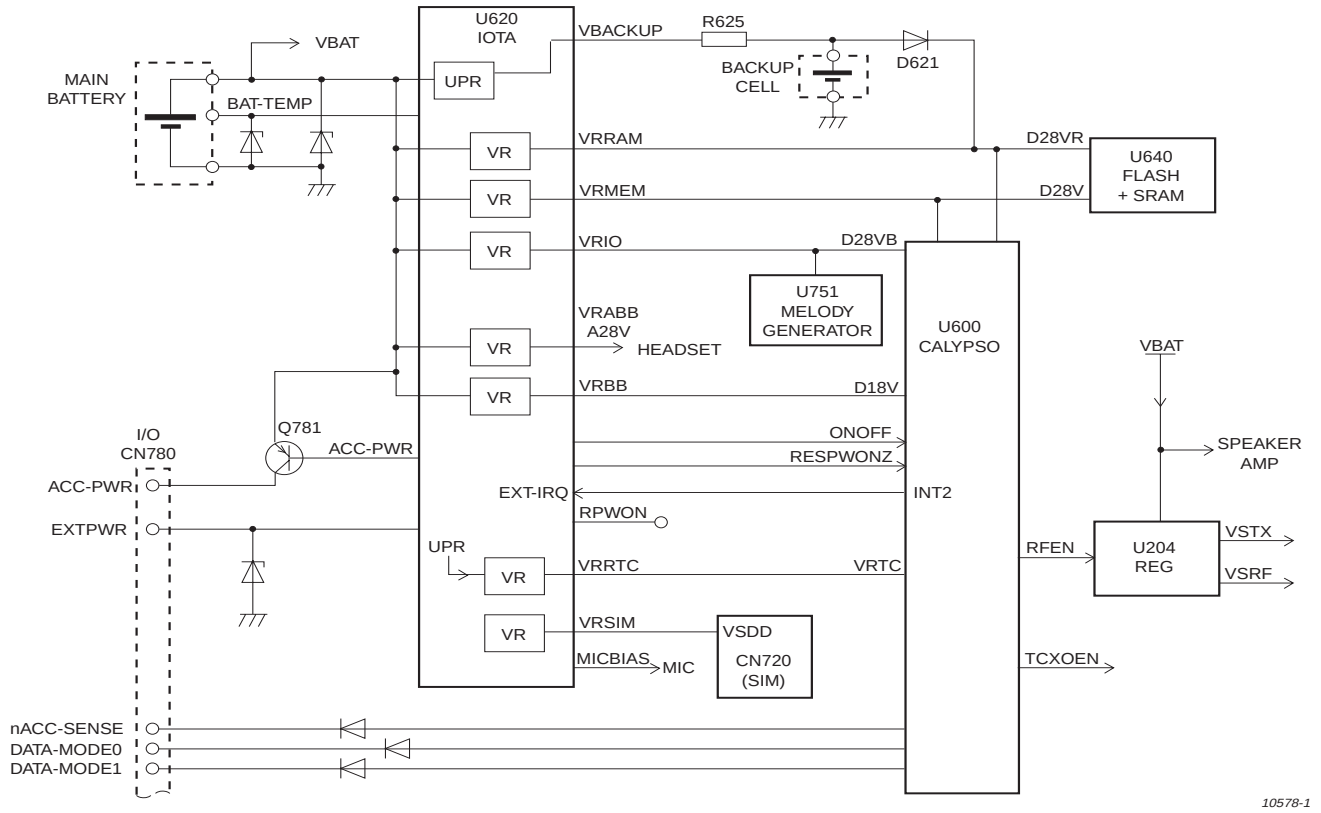


Figure 5.1: Power Supply Block Diagram

The Power Management Block consists of six parts as follows:

1. Power Source
2. Power On/Off Control
3. Power Source Failure detection
4. Voltage Regulation
5. Battery Charging & Monitoring
6. Accessory Control

4.5.2 Power Source

The battery comprises a single Lithium-Ion (Li-Ion) cell with a nominal voltage of 3.7 V and 690 mAh capacity. This type of battery has an advantage in weight and size over Nickel Metal Hydride (NiMH) cells.

4.5.3 Power On / Off Control

The power on sequence can begin when VBAT >2.6 V or VBACKUP >2.6 V. In this state IOTA (U620) is in Power On Condition and internal supply UPR is active. RESPWRONZ signal to CALYPSO (U642) is released high.

If IOTA is in the Power On Condition, one of following conditions start the Power Up sequence.

- Power key is pushed for more than 30 ms.
- RPWON input goes high to low for more than 30 ms (e.g. accessory is connected).
- EXTPWR voltage is higher than (VBAT+0.4) V.
- CALYPSO RTC ALARM signal goes high.

The Power Up sequence is as follows:

1. IOTA internal band gap reference is activated.
2. If VBAT < 3.2 V after a timeout of 51.2 ms Power Up sequence is aborted.
3. All regulators (VRDBB, VRMEM, VRRAM, VRIO, VRABB & VRRTC) are enabled.
4. Power Up status bit and internal Reset bits are set.
5. ONNOFF signal is set to activate CALYPSO.
6. ARM in CALYPSO starts running software using 32 kHz clock, and also starts 26 MHz clock.

The following Power Down sequence can only be started by CALYPSO setting the DEVICE_OFF bit in IOTA or, in emergency case, when VBAT < 2.7 V (or VBAT < Vbackup & VBAT < 2.8 V):

1. If emergency case, INT1 is set low by IOTA.
2. IOTA starts an internal 150 µs watchdog timer to allow CALYPSO to shutdown.
3. ONNOFF signal is reset to deactivate CALYPSO.
4. All regulators (VRDBB, VRMEM, VRRAM, VRIO, VRABB & VRRAM) are disabled.
5. IOTA internal band gap reference is deactivated.

4.5.4 Power Source Detection Failure

The SIM card contains EEPROM. If the power fails (i.e. battery removal) while the SIM is active, the SIM may corrupt its memory as the supply voltage drops out of specification.

There is sufficient time between Low Voltage Alarm (LVA) detection and IOTA switch-off for the software to cease writing to the SIM to prevent corruption without the need for any interrupt signal from IOTA.

4.5.5 Voltage Regulation

The voltage regulators for I/O and memories have a nominal output of 2.8 V, and are designed to provide a minimum 2.7 V output over all load, transients and temperature conditions.

Each power source is specified as follows.

- **VRDBB:** Power supply for the CALYPSO (Lead Mega Module) LMM block.

Voltage	1.8 V ±0.15 V
Current	120 mA max.
Dropout	100 mV max (load max)
Supply	VBAT

This power supply provides the power for CALYPSO internal RAM, ASIC modules, LMM and ARM Blocks, and is selectable from 1.18 V, 1.4 V and 1.8 V.

- **VRIO:** Power supply for IOTA ASIC I/O and CALYPSO.

Voltage	2.8 V ±0.15 V
Current	100 mA max.
Dropout	100 mV max (load max)
Supply	VBAT

This is the main power supply for the baseband digital sections (I/O and LCD) and some analogue sections. It is also used for the digital I/O ring on both CALYPSO and IOTA.

• **VRMEM:** Power supply used by Baseband Digital part.

Voltage	2.8 V ±0.1 V
Current	60 mA max.
Dropout	100 mV max (load max)
Supply	VBAT

Supplies CALYPSO memory interface and external memory components. Selectable between 1.8 V and 2.8 V.

• **VRRAM:** Power supply for external SRAM.

Voltage	2.8 V ±0.1 V
Current	50 mA max.
Dropout	100 mV max (load max)
Supply	VBAT

Supplies the SRAM of U640. When the handset is powered down and the supply is switched off, the external SRAM is supplied from the backup cell to maintain the contents. This regulator is diode protected from reverse supply.

• **VRABB:** Digital power supply for IOTA Analogue section.

Voltage	2.8 V ±0.1 V
Current	80 mA max.
Dropout	100 mV max (load max)
Supply	VBAT

Supplies power for the IOTA onboard analogue section.

• **VRSIM:** Digital Power supply for SIM card.

Voltage	1.8 V ±0.15 V
Current	10 μA max.
Dropout	100 mV max (load max)
Supply	VBAT

Supplies power for the SIM card. Selectable from 1.8 V an 2.85 V.

• **VRTC:** Digital power supply for CALYPSO 32 kHz oscillator and RTC module.

Voltage	1.8 V ±0.15 V
Current	10 μA max.
Dropout	100 mV max (load max)
Supply	UPR

Supplies power for the CALYPSO 32 kHz oscillator and RTC module. Selectable from 1.18 V, 1.4 V and 1.8 V. It is supplied from UPR to enable it to be maintained from the backup cell when the main battery is removed.

4.5.6 Regulator Sleep Function

To reduce power consumption in the analogue section of the baseband chipset, the voltage regulators can be placed in a low power mode or disabled by the processor when it enters a low activity sleep mode. During sleep mode, VRABB is disabled, and VRDBB, VRIO, VRMEM, VRRAM and VRSIM are switched to low power mode.

4.5.7 Battery Charging and Monitoring

The status of the LCD battery icon is determined by the value of BAT_VOLT returned from the IOTA MADC, as indicated in the table:

Icon Status	Battery Pack	
	Li-Ion	
3 bar	3.85 V <	
2 bar	3.76 V <	< 3.85 V
1 bar	3.46 V <	< 3.76 V
Low Voltage Alarm		< 3.46 V

The handset has two types of external charging source, a Switching-type AC-DC adaptor and a 12 V DC-DC Adaptor.

	Input Voltage	Output	
		Voltage	Current
AC Adaptor (Switching type)	100 - 240 V	5.8 V	700 mA
DC Adaptor / Handsfree Charger	12 V	5.8 V	700 mA

Battery charging is controlled by the CPU within the phone. If external power is detected and the temperature is within specified limits, the charger starts the rapid charge algorithm. Charge termination for the Li-Ion battery is reached when the charging current in Constant Voltage mode reaches 50 mA.

Deeply-Discharged Batteries

In the case of deeply discharged batteries, there may not be enough power in the battery to initiate charging. In this case, the charging circuit automatically starts to trickle charge the battery until there is enough power to switch on the phone. LED indication will be provided to the user even though the handset is not active.

After the software controlled charging algorithm starts, the LED will be extinguished when charging is complete. Depending on the trickle charge current (approximately 46 mA when Vbat is 2.5 V) the time to reach fast charge state is less than 16 minutes.

Over Voltage Protection

As the accessory connector CN780 is unique to Panasonic, only approved chargers can be used with the handset. Therefore, no additional circuitry is required within the handset to prevent the charger voltage exceeding the design limit of 7 V.

Backup Battery

When the main battery is removed, the external SRAM and RTC are kept active by a 2.3 mAh backup cell connected to IOTA. IOTA provides a 500 μA charging current for the backup cell which is maintained until Vbat falls below 3.1 V or the main battery is removed.

4.5.8 Accessory Control

The telephone can detect accessories connected to the I/O connector by pulsing ACC_PWR high and checking DATA_MODE0 and DATA_MODE1. It can then communicate with the detected peripheral and control set ACC_PWR where required, as detailed in the following table.

Inputs (Pin No.)			Outputs	Peripherals
DATA_MODE0 (4)	**nACC_SENSE (5)**	**EXT_PWR (13)**	**ACC_PWR (9)**	
High	High	Low	Low	none
High	High	High	Low	AC Adaptor, DC Adaptor
High	Low	Low	High	Factory Test Jig
High	Low	High	Low	H/F, Data cable
Low	Low	Low	High	Not used (H/F Car Kit)
Low	High	Low	High	Charging Data cable
Low	High	High	High	Charging Data cable + AC / DC Adaptor
Low	Low	Low	High	GD95 Data Cable
Low	Low	High	Low	Not used (GD95 Data Cable + HF Car Kit
High	Low	Low	Low	Not used (Bluetooth Adaptor)
High	Low	High	Low	Not used (Bluetooth Adaptor + HF Car Kit)

5 DISASSEMBLY / REASSEMBLY INSTRUCTIONS

5.1. General

This section provides disassembly and reassembly procedures for the main components of the telephone.

These assemblies MUST be performed by qualified service personnel at an authorised service centre.

The following Warnings and Cautions MUST be observed during all disassembly / reassembly operations:

WARNING

The equipment described in this manual contains polarised capacitors utilising liquid electrolyte. These devices are entirely safe provided that neither a short-circuit nor a reverse polarity connection is made across the capacitor terminals. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN DAMAGE TO THE EQUIPMENT OR, AT WORST, POSSIBLE INJURY TO PERSONNEL RESULTING FROM ELECTRIC SHOCK OR THE AFFECTED CAPACITOR EXPLODING. EXTREME CARE MUST BE EXERCISED AT ALL TIMES WHEN HANDLING THESE DEVICES.

Caution

The equipment described in this manual contains electrostatic devices (ESDs). Damage can occur to these devices if the appropriate handling procedure is not adhered to.

5.1.1 ESD Handling Precautions

A working area where ESDs may be handled safely without undue risk of damage from electrostatic discharge, must be available. The area must be equipped as follows:

Working Surfaces

All working surfaces must have a dissipative bench mat, safe for use with live equipment, connected via 1M2 resistor (usually built into the lead) to a common ground point.

Wrist Strap

A quick release skin contact device with a flexible cord, which has an integral safety resistor of between 5k2 and 1M2, shall be used.

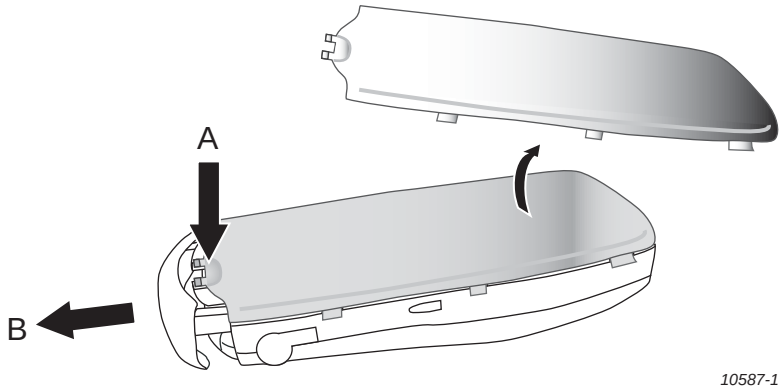
Containers

All containers and storage must be of the conductive type.

5.2. Disassembly

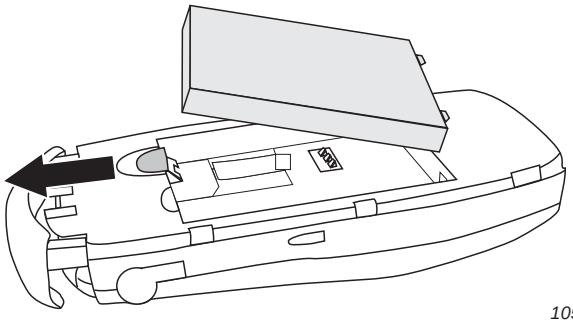
5.2.1. Case Removal

1. Press down on (A) to allow the I/O Connector Cover to open, thus releasing the Battery Cover (B).
2. Gently lift up the Battery Cover.



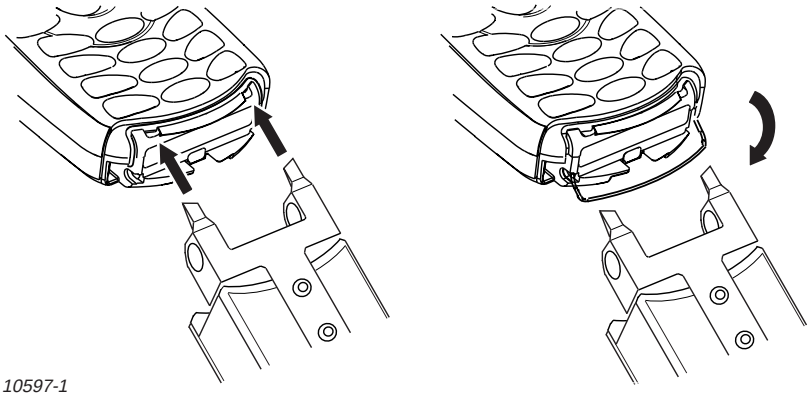
10587-1

3. Slide the Battery Hook in the direction indicated by the arrow.
4. Lift out the Battery.



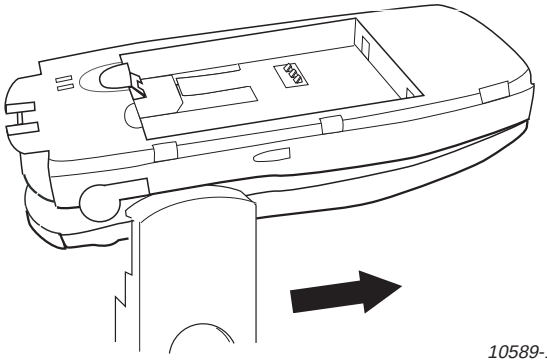
10588-1

5. Set the I/O Cover into the open position (i.e. at right angles to the phone). Unclip the Cover from the phone.
6. Align the two prongs of the Clip Removal Tool with the two recesses above the I/O Connector.
7. Slide the prongs under the retaining spring and lift the spring clear of its seating.



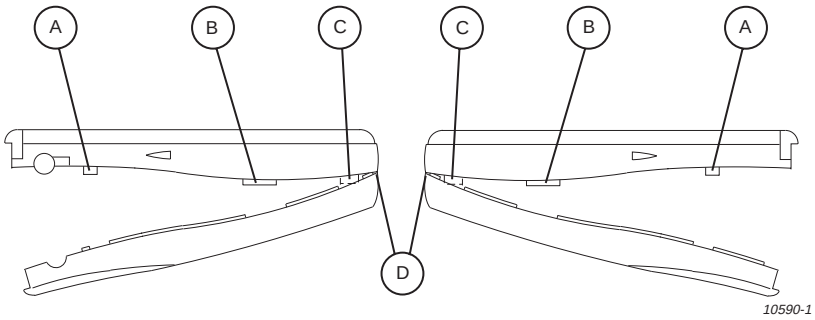
10597-1

8. Separate the case and cover using the Separation Tool shown right.



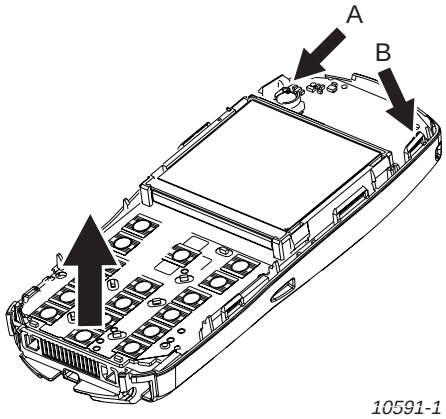
10589-1

9. Starting on one side of the phone, release tags ‘A’, ‘B’ and ‘C’.
10. Continue by releasing tags ‘A’, ‘B’, ‘C’ on the opposite side of the phone before separating the case and cover at tab ‘D’.



10590-1

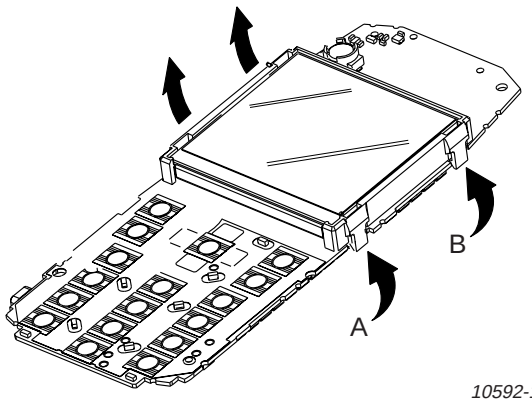
11. Apply outward pressure to the two lugs (marked ‘A’ and ‘B’) to release the PCB from the case.



10591-1

5.2.2. LCD Removal

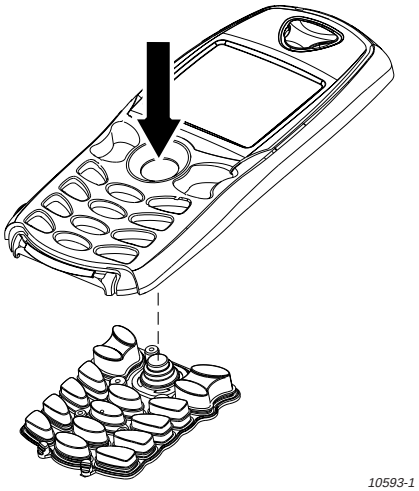
1. Gently prise apart the two ears of the metal snap (marked ‘A’ and ‘B’ in the diagram) so that it is released from the PCB.



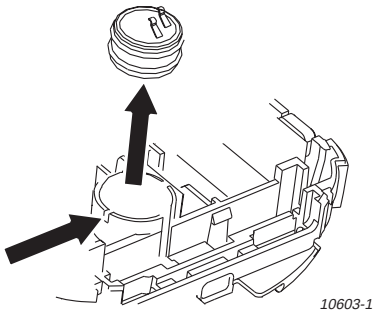
10592-1

5.2.3. Case-Mounted Components

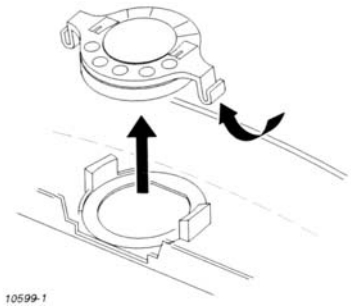
1. Remove the keypad by pressing on the navigation key until the membrane can be peeled away from the case front.



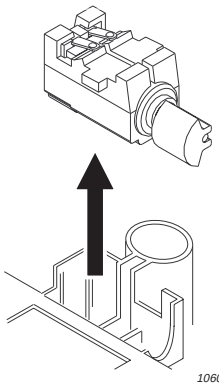
2. Remove the microphone assembly by prising upward with a small pair of tweezers or similar blunt object through the slot in the side of the microphone holder.



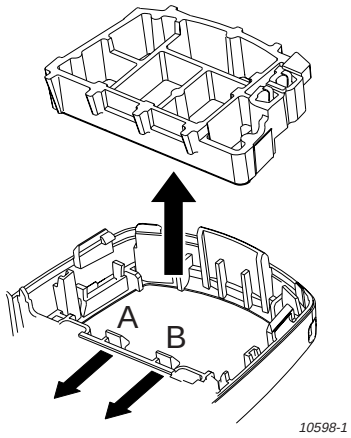
3. Lift one of the ears on the speaker (receiver) to remove the assembly from the case.



4. The Vibrate motor may be lifted from the case by gently applying pressure under the spindle / counterweight.



5. Apply pressure to lugs A and B in direction shown to release the antenna from the case.



10598-1

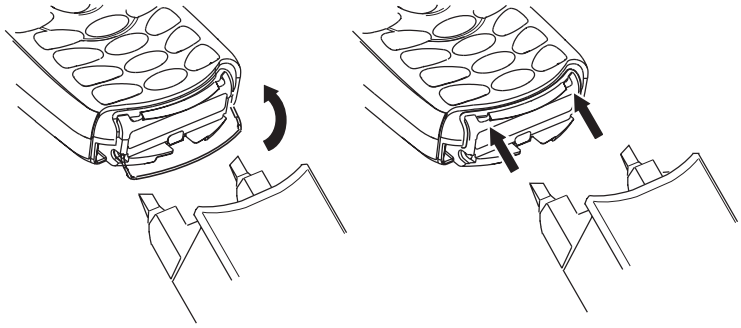
5.3. Reassembly

Reassembly is the reverse of disassembly.

IF ANY OF THE RF OR LOGIC SHIELDS ARE REMOVED FROM THE PCB AT ANY TIME, THEY MUST BE REPLACED BY NEW ITEMS. ONCE REMOVED, THE SHIELDS MUST **NOT** BE REUSED.

Using the Clip Removal Tool as shown, position the retaining spring so that it is aligned over the corresponding recess on the case front.

Gently tilt the Clip Removal Tool to allow the spring to locate into its recess.



10627-1

The I/O Cover MUST be reattached in the ‘open’ position, i.e. at right angles to the phone. Ensure that all springs and hooks are in position inside the Case Back.

If the metal SAR spring inside the Front Cover is damaged, the complete Cover Assembly must be replaced.

On completion of reassembly, the handset must be re-calibrated as detailed in Section 8.

6 REPAIR PROCEDURES

6.1. Introduction

This section provides information on testing the telephone. The layout is as follows:

Section 6.2: Lead Free (PbF) solder: Identification and repair of PCBs using Pbf solder.
Section 6.3 External testing: describes equipment requirements and general set up procedure.
Section 6.4 Complete Unit Test Setup: describes how the items of test equipment are used together and general set up procedure.
Section 6.5 Channel box test commands: provides detailed explanation of the different commands available using the test equipment and channel-box software.

Calibration Procedures are described in Section 8.

6.2. Lead Free (PbF) solder

CAUTION

The Printed Circuit Board (PCB) used in this telephone has been manufactured using Lead Free solder.

Lead Free solder has a higher melting point than Lead solder - typically 30 - 40 °C higher. Always use a high temperature soldering iron When using a soldering iron with temperature control, it should be set to 370 ±10 °C (700 ± 20°F).

When using lead solder, all PbF solder must be removed from the solder area. Where this is not possible, heat the PbF solder until it melts before applying lead solder.

Avoid overheating PbF solder as it has a tendency to splash at temperatures above 600 °C (1100 °F).

6.3. External Testing

6.3.1 General Information

The handset can be connected to a compatible personal computer for electronic adjustment and fault diagnosis. This section provides a description of the equipment required to perform those tasks.

Prior to testing and adjustment, the unit should first be disassembled, as detailed in Section 5, and then the PCB connected to the PCB Repair Jig. Fault tracing can be performed on the PCB using suitable test equipment, such as spectrum analysers and oscilloscopes.

The unit must be tested and calibrated for both frequency bands (900 MHz and 1800 MHz).

6.3.2 Jigs and Tools

Interface Box (Part No. IFB003 / IFB004)

The Interface box provides:

1. IFB003: Voltage regulation for +7.2 V, +5.6 V or 4.8 V DC outputs. The +7.2 V switch setting is used as a supply to Li-Ion type batteries (compatible for other products), the 5.6 V switch setting is used for PCB testing and the 4.8 V switch setting is used for testing the complete unit.
2. Interface Box IFB004 is a later version that provides +4.8 V, +7.2V and +8.2 V DC outputs. It also allows selection of external power via the Interface cable.
3. RS 232 interface. Ensures that the Unit Under Test is supplied with the correct signal levels and format.

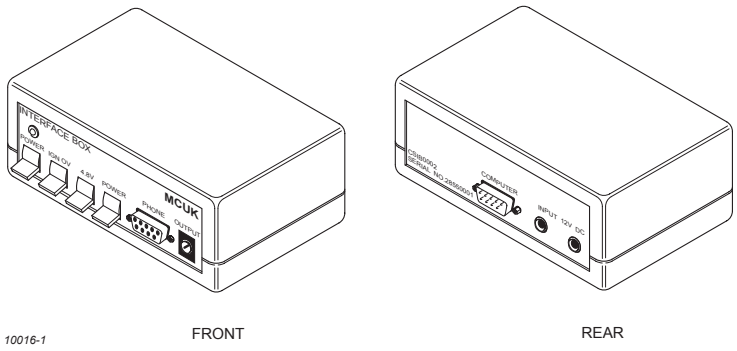


Figure 6.1: Interface Box IFB003 / IFB004

Personal Computer (PC)

The PC (IBM compatible) is used as a Unit Under Test controller. This, in conjunction with the channel box software, allows all of the test facilities normally provided through the keypad of the Unit Under Test.

Power Supply

Provides 12 V DC supply to Interface box IFB003 or IFB004.

PCB Repair Jig (Part No. JT00082)

Caution
The power cable has a large capacitor across the positive and negative leads to reduce the loading effect on the power supply during RF calibration. Therefore, it is important that the correct polarity of the cables is observed, otherwise serious damage will occur to the capacitor.

The PCB Repair Jig provides the necessary connections between the PCB Assembly and external test equipment. It is required for RF calibration.

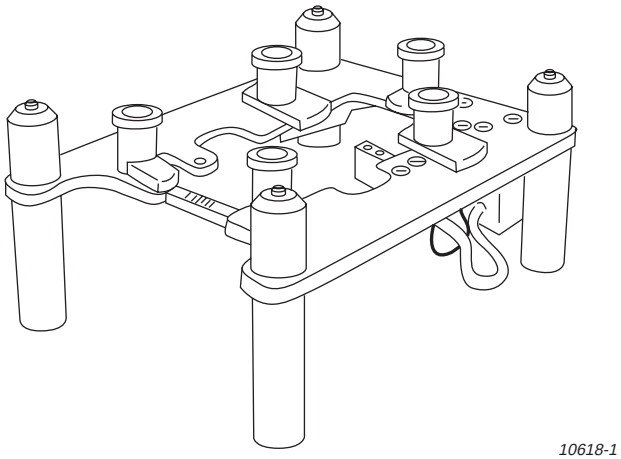


Figure 6.2: PCB Repair Jig

A cable with an N-Type male connector and SMA female connector will be required to make the RF connection between the Repair Jig and service equipment.

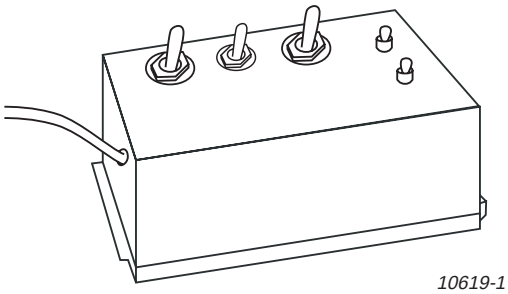
A replacement RF Probe for the Repair Jig is available as a spares item.

GSM Tester

This unit acts as a base station providing all the necessary GSM signalling requirements and also provides GSM signal measuring facilities.

Dummy Battery (Part No. JT00083)

The dummy battery is used for baseband calibration and to power the phone without a battery. It is powered from the Interface Box. It differs from previous models in that it obviates the need for a Battery Calibration Voltage Control Unit (BCVCU).



10619-1

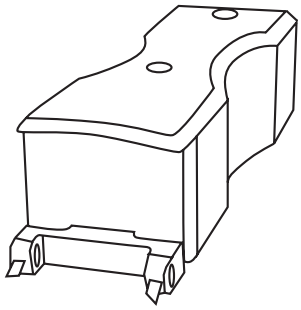
Figure 6.3: Dummy Battery

Channel Box Software

This is the test software for the telephone unit and should be installed onto the personal computer to be used for testing.

Clip Removal Tool (Part No. JT00085)

The Clip Removal Tool is used to facilitate the removal and refitting of the spring clip which holds the cover and case assemblies together.

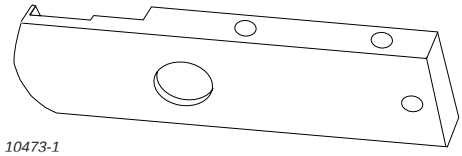


10596-1

Figure 6.4: Clip Removal Tool

Case Separation Tool (Part No. JT00059)

The Case Separation Tool is used to facilitate separation of the front cover and case.



10473-1

Figure 6.5: Case Separation Tool

6.4. Test Equipment Setup

6.4.1 Equipment Required

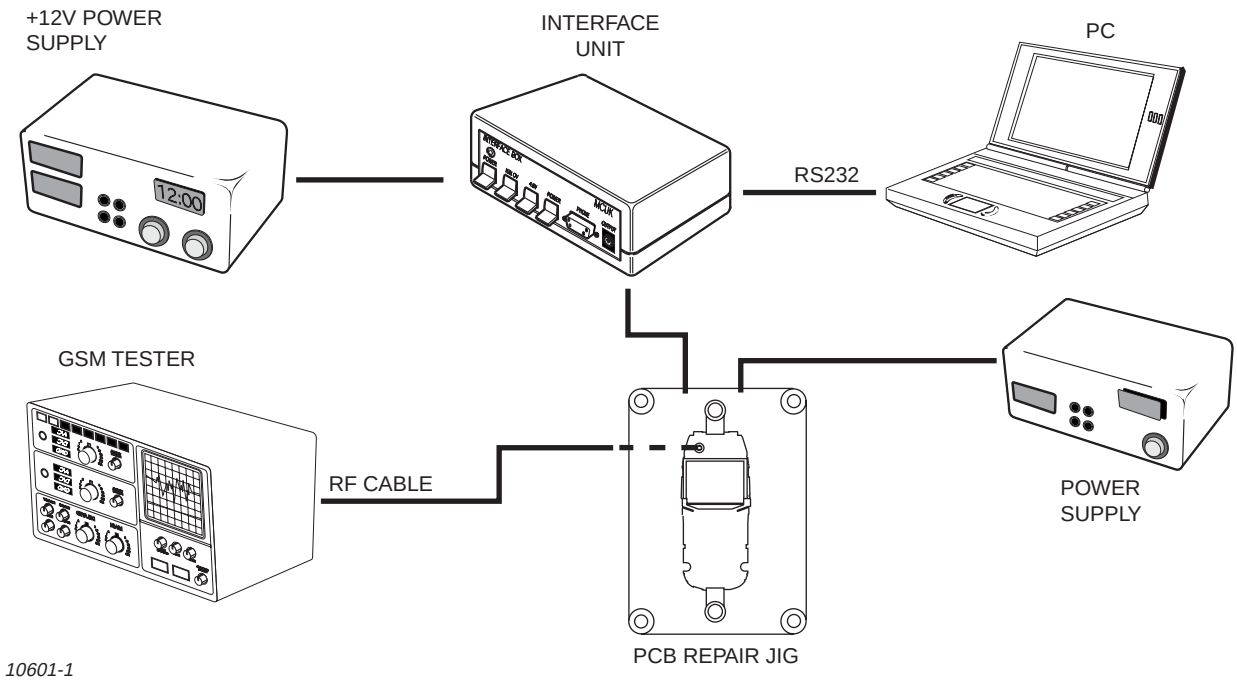


Figure 6.6: Test Connection Diagram

IMPORTANT NOTE

To allow accurate measurement of the complete unit the test equipment must be connected as shown.

For testing the handheld unit the following equipment is required:

1. PCB Repair Jig.
2. Interface Box IFB003 or IFB004
3. 12 V power supply
4. Personal computer with RS232 interface and running Microsoft Windows® 95, 98 or NT
5. RS232 interface cable (9 pin straight through connection)
6. GSM test station.
7. Panasonic Channel Box software for Microsoft Windows ®.

The Channel Box software should be installed onto the main drive of the personal computer.

The RF cable is connected to the GSM test station via a suitable adaptor. The 12 V supply is connected to the rear socket of the Interface box.

NOTE: A suitable test SIM card compatible with the GSM test station will be required.

6.4.2 Using the Channel Box software

1. Connect the PCB and test equipment as shown in Figure 6.6:
2. Ensure that the following settings are made:

Interface box IFB003 or IFB004

Power:	ON position
IGN:	OFF position
Ext Pwr:	OFF position
Voltage:	Top position (8.2 V)

3. Place the GD67 PCB into the repair jig, taking care not to damage the sensitive RF probe.
4. Connect a power supply to the power cables of the PCB repair jig. Set the power supply to 3.6 V.
5. Start the Windows Channel Box software. The main screen should display as shown below:

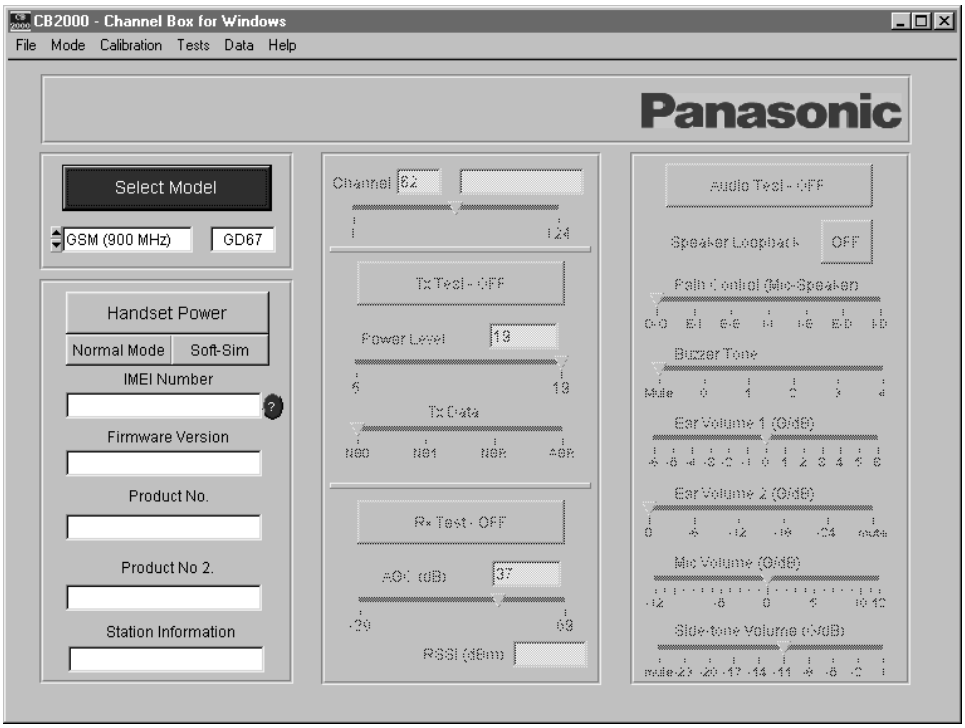


Figure 6.7: Channel Box Main Screen

1. Click on the SELECT MODEL button on the main screen. In the pop-up window, select GD67 from the list box and click on the OK button.

6. Click on the HANDSET POWER button and, within one second, switch on the handset using the key.
7. Check that the handset is powered-up (LCD is backlit and all LEDs are on). The Channel Box should also display handset IMEI number and Firmware version information in the left-hand column of the screen. A toolbar should also be visible in the top panel where the Panasonic logo is displayed.

Figure 6.8: Channel Box Toolbar

Additional user instructions are provided in the documentation files supplied with the Channel Box.

7 INTERFACES AND TEST POINTS

7.1. Interfaces

7.1.1 External I/O

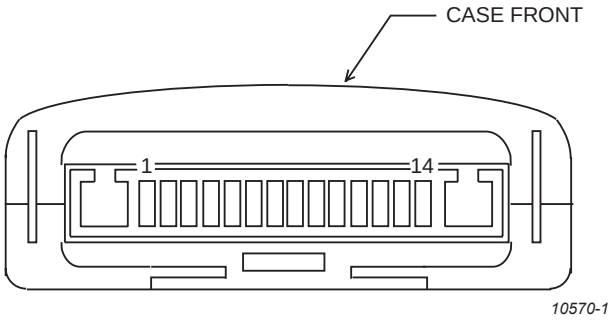
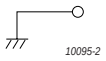
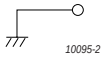
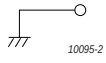
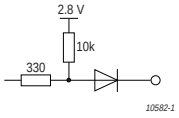
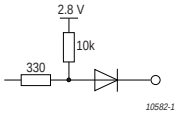
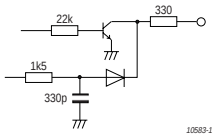
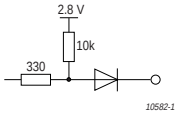
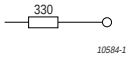
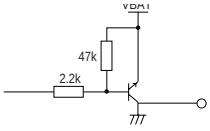
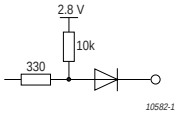
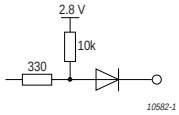
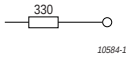
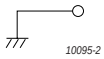


Figure 7.1: External I/O Connector

No.	Name	HH <==>EXT	Function	H/H Circuit
1	AGND	-	Audio Ground	
2	AUDIO_UP	<==	not used	
3	AUDIO_DN	==>	not used	
4	DATA MODE0 / VBAT IN	<==	Accessory Recognition 0 / Battery Voltage Supply input	
5	nACC_SENSE	<==	Data Accessory detection	
6	nAUDIO-ON / PAON	==>	Audio Path Control (L: On = un mute, Hi-Z: Off = mute) PA control signal for test trigger (L :off H 2.8 V:on)	
7	SERIAL_UP	<==	Upward serial (9600 bps: SMS cable) (33.8 kbps: Data adaptor I/F Card) (up to 38.4 kbps: Soft Modem cable) (115.2 kbps: Test Command)	
8	SERIAL_DN	==>	Downward serial (Baud rate is the same as SERIAL-UP)	
9	ACC_PWR	==>	Peripheral power supply (on: less than 50 mA)	
10	DTR / DATA_MODE1	<==	RS232C: Data Terminal Ready / Data Accessory recognition 1	

No.	Name	HH <==>EXT	Function	H/H Circuit
11	RTS	<==	RS232C: Request to Send	
12	CTS	==>	RS232C Clear to Send	
13	EXT-PWR	<==	Power supply for Battery Charge	
14	GND	-	Power supply and digital signal ground	

7.1.2 LCD Module Interface Connections

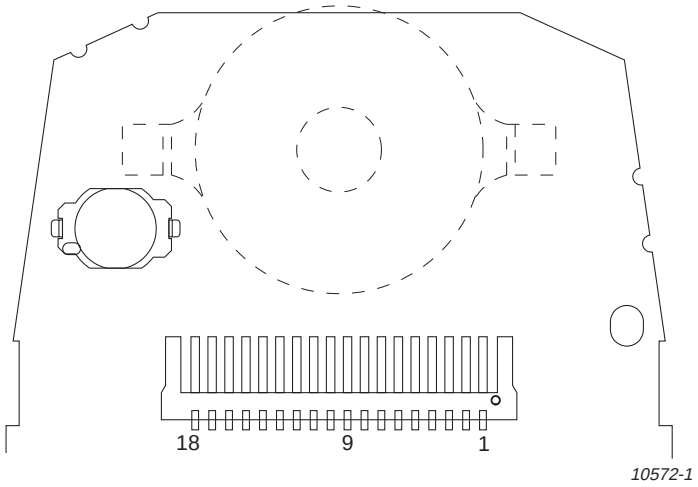
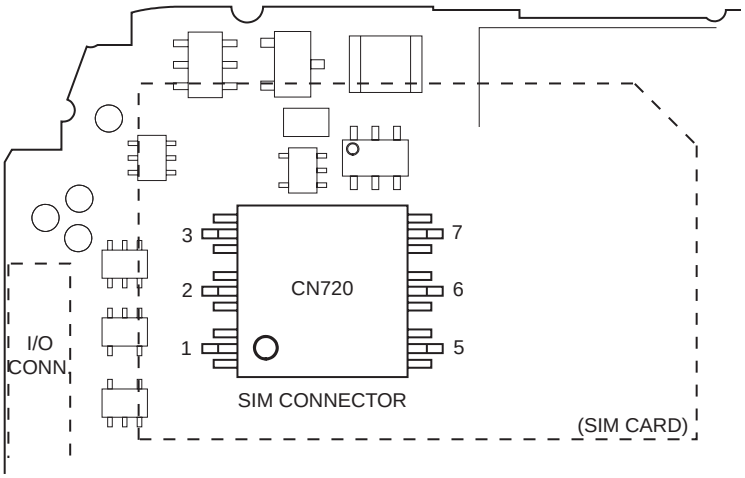


Figure 7.2: LCD Module Connector

Pin	Signal	PCB-LCD	Function	Connection	Status
1	LED1-	-	BACKLIGHT LED1 CATHODE	Q732 #4	
2	LED+	-	LED SUPPLY VOLTAGE 4.5 V	D621 #1	
3	LED2-	-	BACKLIGHT LED2 CATHODE	Q732 #4	
4	VDD	-	POWER SOURCE FOR LCD MODULE	D28V	
5	GROUND	-		GND	
6	nRESET	->	RESET SIGNAL	CALYPSO #N2	
7	nCS±CD	->	LCD CHIP SELECT SIGNAL	CALYPSO #D3	CALYPSO nCS3
8	LCD±RS	->	LCD DATA / COMMAND SELECT	CALYPSO #M4	CALYPSO IO3
9	RnW	->	LCD WRITE	U730 #4	RnW or WAIT
10	D[0]	->	DATA BUS BIT 0	CALYPSO #B7	
11	D[1]	->	DATA BUS BIT 1	CALYPSO #D7	
12	D[2]	->	DATA BUS BIT 2	CALYPSO #E7	
13	D[3]	->	DATA BUS BIT 3	CALYPSO #D6	
14	D[4]	->	DATA BUS BIT 4	CALYPSO #A6	
15	D[5]	->	DATA BUS BIT 5	CALYPSO #C6	
16	D[6]	->	DATA BUS BIT 6	CALYPSO #E6	
17	D[7]	->	DATA BUS BIT 7	CALYPSO #C5	
18	GROUND	-		GND	

7.1.3 SIM Interface

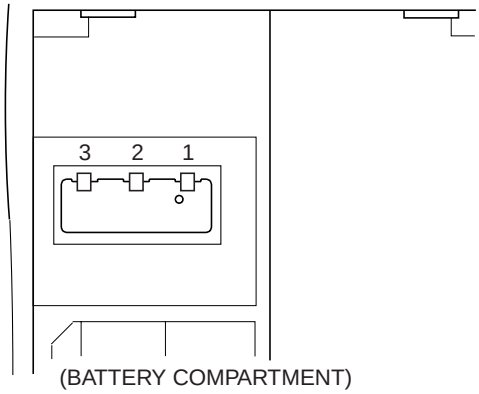


PIN	SIGNAL
1	SIMPWR (3W)
2	SIM_RST
3	SIM_CLK
4	Not connected
5	GROUND
6	Not connected
7	SIM-I/O
8	Not connected

10573-1

Figure 7.3: SIM Connection Details

7.1.4 Battery Connector



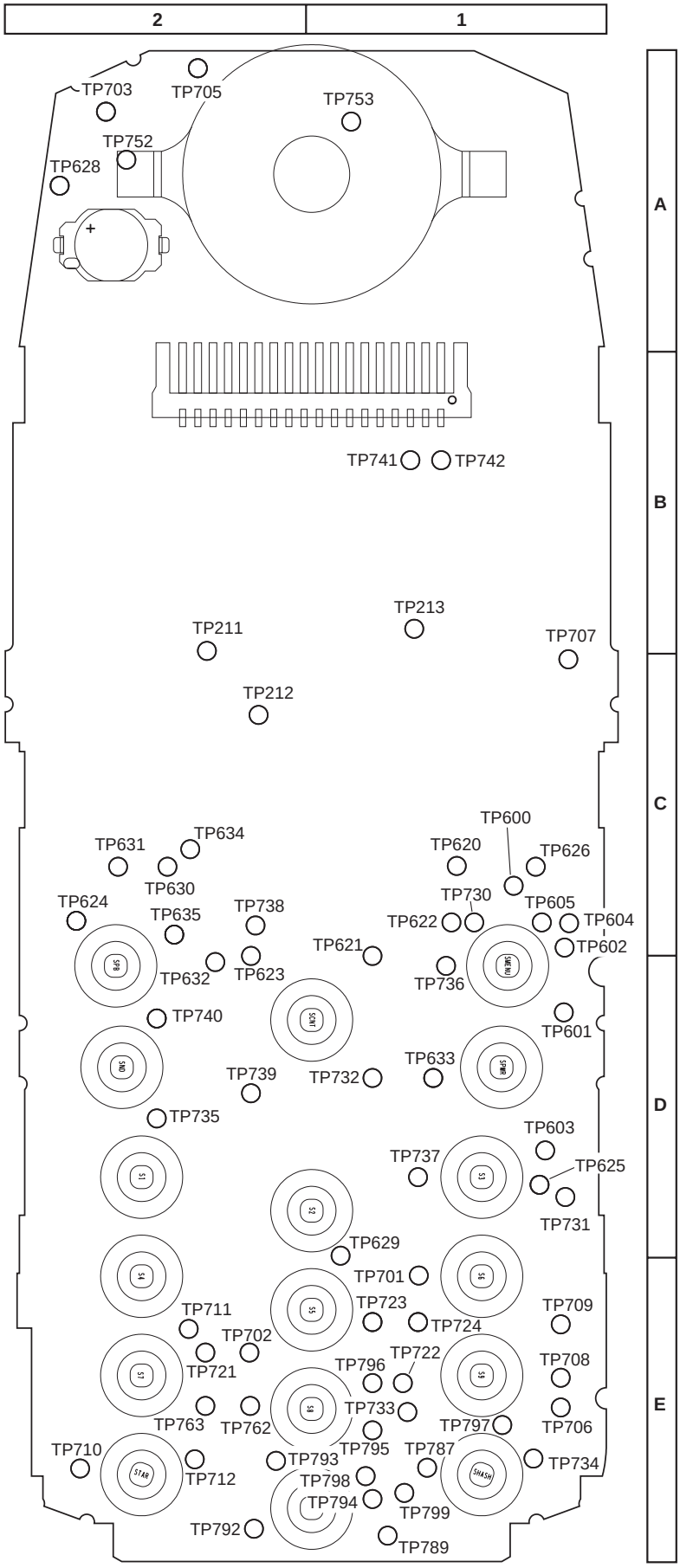
PIN	SIGNAL
1	VBAT (+)
2	BAT TEMP
3	GROUND (-)

10574-1

Figure 7.4: Battery Connection Details

7.2. Test Points

TP No	Signal	Grid
TP211	TCXO-EN	B2
TP212	AFC	B1
TP213	FSYS±BB	C2
TP600	32 kHz CLOCK	C1
TP601	TDO (CALYPSO)	D1
TP602	TCK (CALYPSO)	C1
TP603	TMS	D1
TP604	nBSCAN	C1
TP605	TDI	C1
TP620	ONNOFF	C1
TP621	D18V	D1
TP622	D28VB	C1
TP623	D28V	D2
TP624	A28V	C2
TP625	D28VR	D1
TP626	VRTC	C1
TP628	VBACKUP	A2
TP629	VRSIM	D1
TP630	TDO (IOTA)	C2
TP631	TDI (IOTA)	C2
TP632	TESTRESETZ	D2
TP633	PWON	D1
TP634	VCXO±TEMP	C2
TP635	DAC (IOTA)	C2
TP701	BACKLIGHT LEDs	E1
TP702	GROUND	E2
TP703	PAGE±LED	A2
TP705	CHARGE±LED	A2
TP706	VBAT	E1
TP707	BAT-TEMP	C1
TP708	VBAT	E1
TP709	GROUND	E1
TP710	nPHF-DET	E2
TP711	PHF MICROPHONE	E2
TP712	PHF EARPIECE	E2
TP721	VIBRATE MOTOR (VIB±C)	E2
TP722	SIM±IO	E1
TP723	SIM±RST	E1
TP724	SIM±CLK	E1
TP730	KBR[0]	C1
TP731	KBR[1]	D1
TP732	KBR[2]	D1
TP733	KBR[3]	E1
TP734	KBR[4]	E1
TP735	KBC[0]	D2
TP736	KBC[1]	D1
TP737	KBC[2]	D1
TP738	KBC[3]	C2
TP739	KBC[4]	D2
TP740	LED SUPPLY (4.5 V)	D2
TP741	BACKLIGHT LED (Q732#4)	B1
TP742	BACKLIGHT LED (Q732#4)	B1
TP752	SPEAKER VO2	A2
TP753	SPEAKER VO1	A1
TP762	MICROPHONE (MICIP)	E2
TP763	MICROPHONE (MICIN)	E2
TP787	EXTPWR	E1
TP789	nAUDIO±ON / PAON	E1
TP792	DATA±MODE0 / VBAT±IN	E2
TP793	nACC±SENSE	E2
TP794	SERIAL±UP	E1
TP795	SERIAL±DN	E1
TP796	ACC±PWR	E1
TP797	DTR / DATA±MODE1	E1
TP798	RTS	E1
TP799	CTS	E1



10569-1

Figure 7.5: Location of Test Points

8 CALIBRATION PROCEDURES

8.1. Introduction

NOTE: *See Section* 6.3. *for a list of the equipment and setup procedures required to perform the following adjustment and calibration procedures.*

The following procedures MUST be performed after replacement or repair of the PCB. Failure to do so may result in incorrect operation of the telephone.

The following adjustments MUST be made to the PCB using the specified PCB Repair Jig. The applied voltage should be a constant 3.7 V DC at 2 A.

There are two distinct calibration procedures to adjust RF performance. These procedures are:

1. Carrier Power calibration (Section 8.2.)
2. RSSI (Section 8.3.)

To ensure that the phone is within set SAR margins after a Peak Power Calibration has been performed, a power meter that is accurate to 0.2 dB MUST be used.

The output power of the phone can be influenced by the RF Shield cans, therefore all power calibration procedures MUST be performed with the shield can wall sections and lids in place.

IF ANY OF THE RF OR LOGIC SHIELDS ARE REMOVED FROM THE PCB AT ANY TIME, THEY MUST BE REPLACED BY NEW ITEMS. ONCE REMOVED, THE SHIELDS MUST **NOT** BE REUSED.

Battery calibration includes checks on voltage, temperature and charging. These procedures are described in Section 8.4. Adjustment data selected during calibration is stored in Flash ROM.

8.2. Carrier Power Calibration

8.2.1 General Information

Tx Calibration can be performed manually or automatically. Automatic Calibration is the preferred method but requires a Gigatronics 8541C power meter. Manual Calibration is used to adjust or verify each calibration channel in turn.

To minimise the variation of Tx power with frequency due to component tolerance, each GSM band is split into sub-bands, which are calibrated separately. The calibration bands and channels used are as follows:

Band Start	Band Stop	Calibration Channel	Sub-band
975	1009	992	PL_GSM_Bch
1010	20	3	PL_GSM_Lch
21	55	38	PL_GSM_Mch
56	90	73	PL_GSM_Hch
91	124	108	PL_GSM_Tch
512	586	544	PL_GSM_Bch
587	661	624	PL_DCS_Lch
662	736	698	PL_DCS_Mch
737	811	774	PL_DCS_Hch
812	885	885	PL_DCS_Tch

E-GSM 900

The following table shows the measurement limits according to power level:

Power Level (PL)	Output Power (dBm)		
	Nominal	Target	
		Min	Max
5	31.75	31.5	32.0
6	30.5	30.0	30.8
7	28.9	28.4	29.4
8	27	26.5	27.5
9	25	24.5	25.5
10	23	22.5	23.5
11	21	20.5	21.5
12	19	18.5	19.5
13	17	16.5	17.5
14	15	14.5	15.5
15	13	12.5	13.5
16	11	10.5	11.5
17	9	8.5	9.5
18	7	6.5	7.5
19	5	4.5	5.5

GSM 1800

The following table shows the measurement limits according to power level:

Power Level (PL)	Output Power (dBm)		
	Nominal	Target	
		Min	Max
0	28.75	28.5	29.0
1	27.4	26.9	27.9
2	25.8	25.3	26.3
3	24	23.5	24.5
4	22	21.5	22.5
5	20	19.5	20.5
6	18	17.5	18.5
7	16	15.5	16.5
8	14	13.5	14.5
9	12	11.5	12.5
10	10	9.5	10.5
11	8	7.5	8.5
12	6	5.5	6.5
13	4.5	4	5
14	3	2.5	3.5
15	1.5	1	2

The values in these tables are required only if manual Tx Trim is used to trim individual channels.

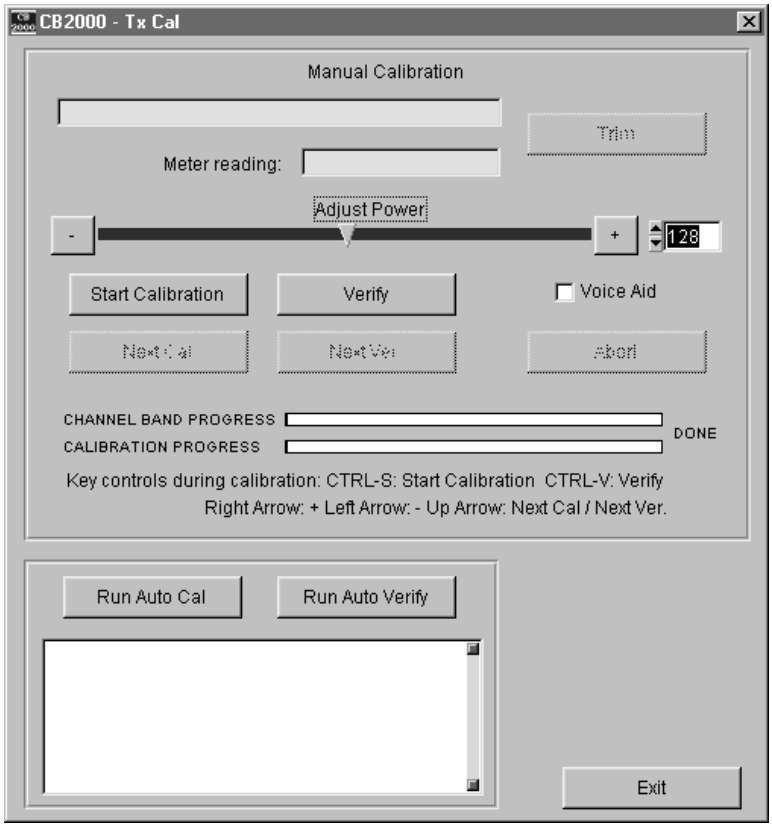
8.2.2 Automatic Calibration Procedure

This procedure requires the use of a Gigatronics 8541C power meter.

NOTE: *To ensure that the telephone operates within set SAR margins, Panasonic recommends that a power meter capable of measurement to an accuracy of ±0.2 dB is used when calibrating power levels. Use of a less accurate power meter may result in the telephone failing to meet SAR standards.*

1. Connect the test equipment as shown in Figure 6.6:
2. Select GD67 and then select the required band, e.g. 'GSM (900 MHz)'.
3. With the Channel Box software running, click on the TX CAL button 

4. The Tx Calibration screen should be displayed:



5. To start automatic calibration, click the FULL AUTO CAL button.
6. Once the automatic calibration has finished, click on the FULL AUTO VERIFY button to verify the calibration.
7. When finished, click on the EXIT button to save data to the handset. A confirmation message will be displayed on the handset LCD.

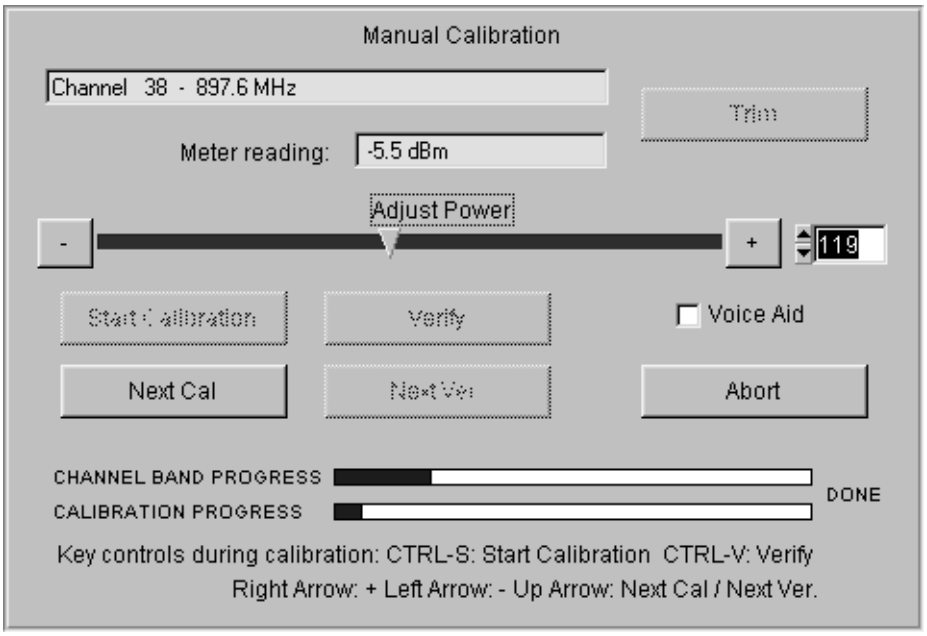
8.2.3 Manual Calibration Procedure

This procedure is used to adjust or verify each calibration channel in turn.

NOTE: *To ensure that the telephone operates within set SAR margins, Panasonic recommends that a power meter capable of measurement to an accuracy of ±0.2 dB is used when calibrating power levels. Use of a less accurate power meter may result in the telephone failing to meet SAR standards.*

1. Ensure the correct offset values for attenuation are stored in the Setup menu.
2. Connect the test equipment as shown in Figure 6.6:
3. Select GD67 and then select the required band, e.g. 'GSM (900 MHz)'.
4. With the Channel Box software running, click on the TX CAL button 

5. The Tx Calibration screen should be displayed.
6. Within the Manual Calibration area of the screen, click on the START CALIBRATION button.



7. Carry out any instruction displayed in the top text box. The second text box displays the expected power meter reading for the given channel. The text box to the right of the ADJUST POWER slider displays the current DAC value for the channel.
8. Adjust the slider or enter a new DAC value until the power meter is within the power limits listed in paragraph 8.2.1.

   (Adjustment is achieved by clicking on the ▲▼ arrows to increase or decrease the DAC value, - by typing in the value directly into the DAC value text box, - or moving the ADJUST POWER slider by dragging with the PC mouse.)

   If required, check the VOICE AID box for aural confirmation of the expected power meter reading. The Voice Aid is played back through a sound card - if one is fitted to the PC. Note that if other media programs are running, e.g. Winamp, an error message may be returned.
9. Click on the NEXT CAL button and repeat steps 7 and 8. When the message **"Copy cal. values operation - click Next cal. button"**, click the NEXT CAL button.
10. When manual calibration is complete, the new DAC values will be calculated and downloaded to the handset. The message: **"Downloading new DAC values - do not remove handset"** will be displayed on the phone.
11. On completion of manual calibration, the Verification procedure MUST be followed as detailed in Section 8.2.4.

8.2.4. Manual Verification Procedure

1. If the Manual Calibration screen is not already open, carry out steps 1 to 5 of Section 8.2.3
2. Click on the VERIFY Button.
3. Read the expected power and check against the power-meter value.
4. If the values are not correct, adjust them by clicking on the TRIM button to open the Trim Power Level window.

Adjust the slider or enter a new DAC value until the power meter is within the power limits listed in paragraph 8.2.1.

(Adjustment is achieved by clicking on the ▲▼ arrows to increase or decrease the DAC value, - or by typing in the value directly into the DAC value text box.)

Click on the APPLY button to accept the new DAC value - or click on the EXIT button to accept the current setting.

5. If required, check the VOICE AID box for aural confirmation of the expected power meter reading. The Voice Aid is played back through a sound card - if one is fitted to the PC. Note that if other media programs are running, e.g. Winamp, an error message may be returned.
6. Click on the NEXT VER button and repeat steps 3 and 4. When the calibration progress bar is full, the NEXT VER button will dim and the screen will reset.
7. The Verification procedure is now complete.

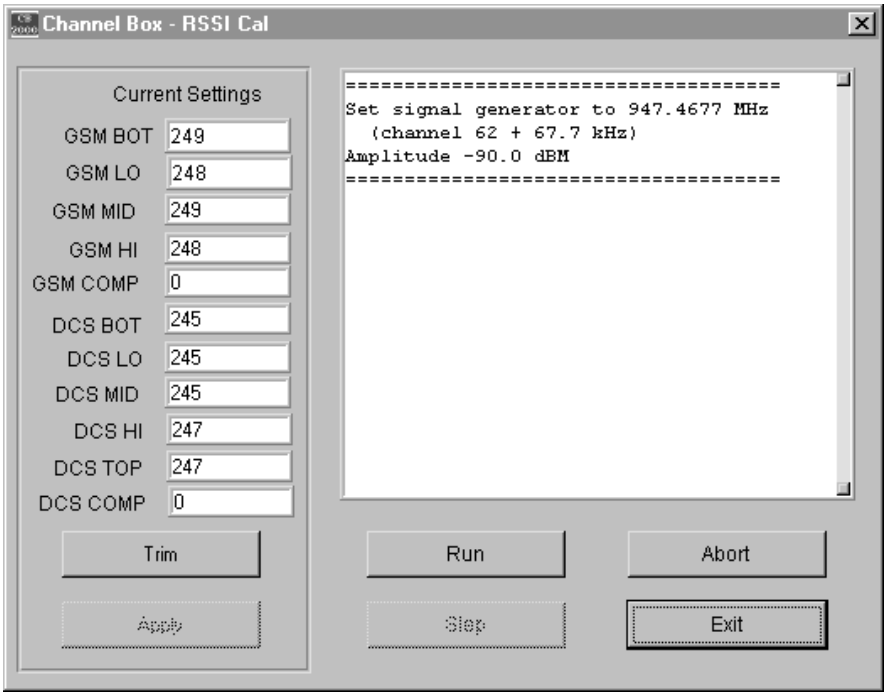
8.3. RSSI

This procedure describes the calibration of RSSI on the mid-channel. This procedure must also be carried out for the low / bottom channel and high / top channel.

The procedure is as follows:

1. Connect the test equipment as shown in Figure 6.6:
2. With the Channel Box software running, click on the RX CAL button 

3. Click on the RUN button.
4. Click on the STEP button.
5. Carry out the instructions described in the main dialogue window.



6. Repeat steps 4 and 5 until the STEP button is greyed out (i.e. cannot be selected).
7. Click on the EXIT button when finished.

8.4. Battery Calibration

8.4.1 Preliminaries

There are two procedures associated with battery calibration, battery temperature and battery voltage. A dummy battery, as listed in Section 6.3.2, is required to perform these checks.

1. Connect the dummy battery, telephone and PC as shown in the diagram below.

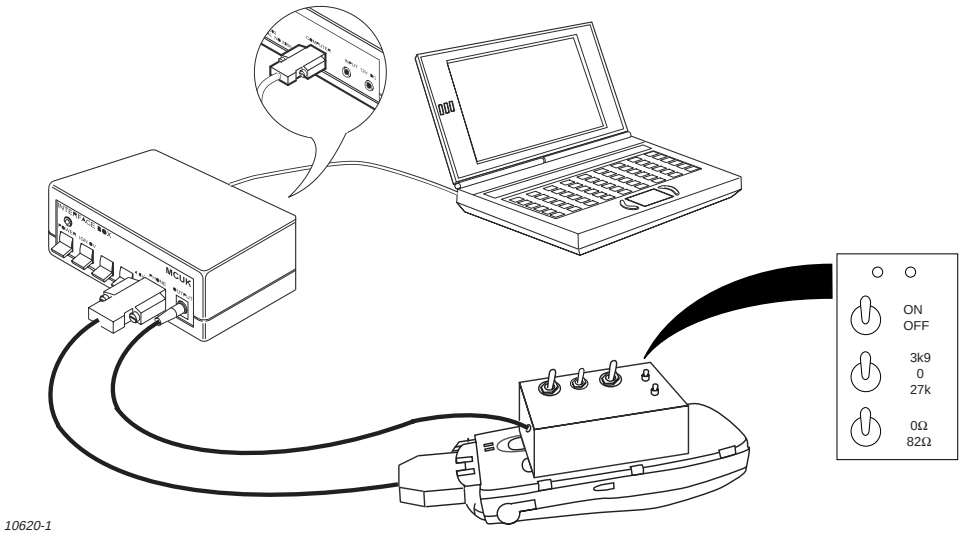
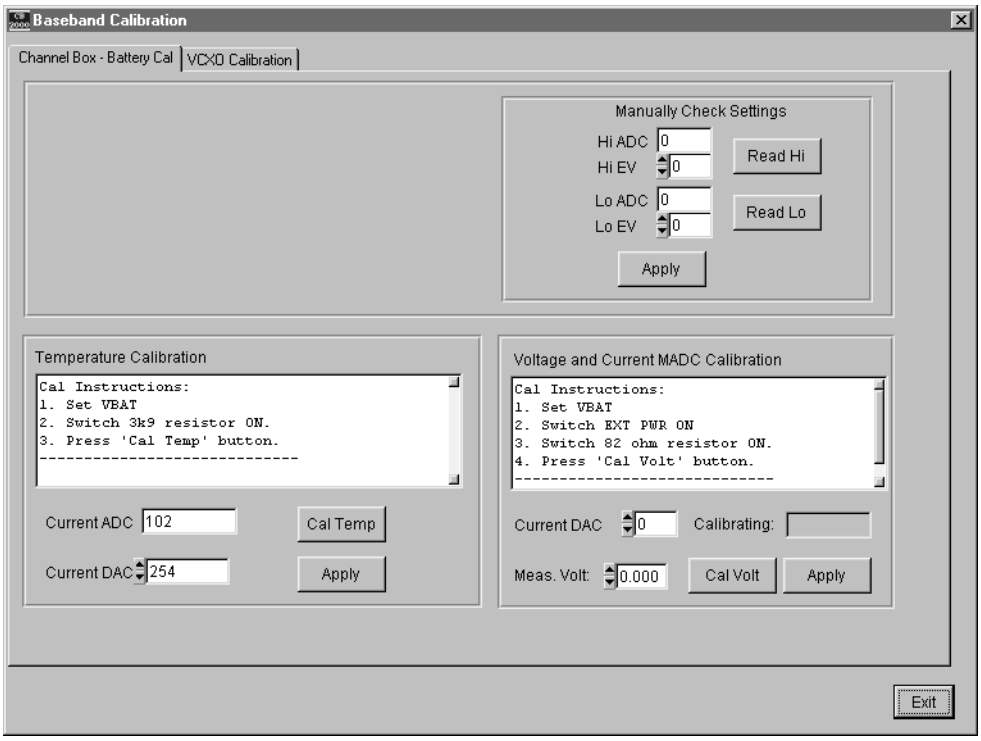


Figure 8.1: Battery calibration test connections

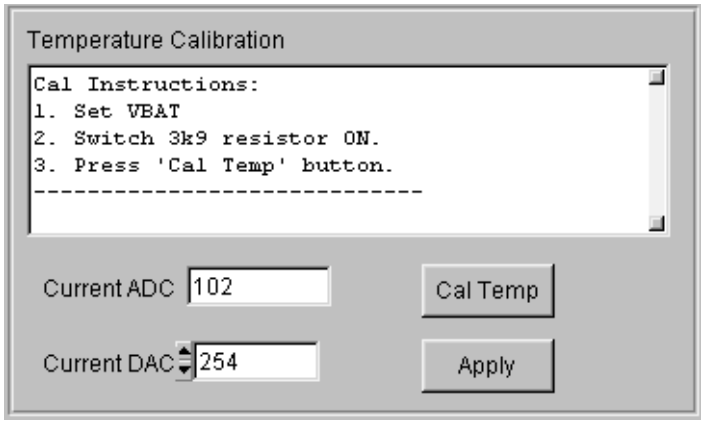
2. Set the Interface box to POWER ON, IGN and EXT PWR OFF.
3. With the Channel Box software running, click on the Battery Calibration button 

4. The Battery Calibration window is divided into two areas:
   a) Temperature calibration
   b) Voltage and Current MDAC calibration.



8.4.2 Temperature Calibration

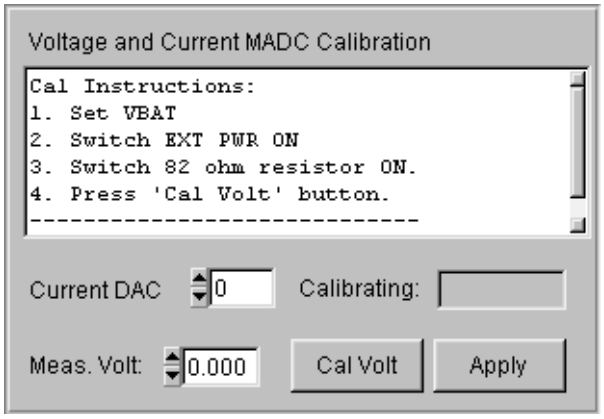
1. Ensure that VBAT is set to 4.1 V.
2. Carry out the instructions described in the main dialogue window.



3. If at any time the message **"Temperature Cal failed"**, the calibration procedure has failed. Check all test equipment connections and that the correct resistor has been selected before suspecting a problem with the handset. Further information may be displayed in the dialogue window.
2. When the message **"Temperature Cal Done"** is displayed in the dialogue window, the calibration procedure has been completed.

8.4.3 Voltage and Current MDAC Calibration

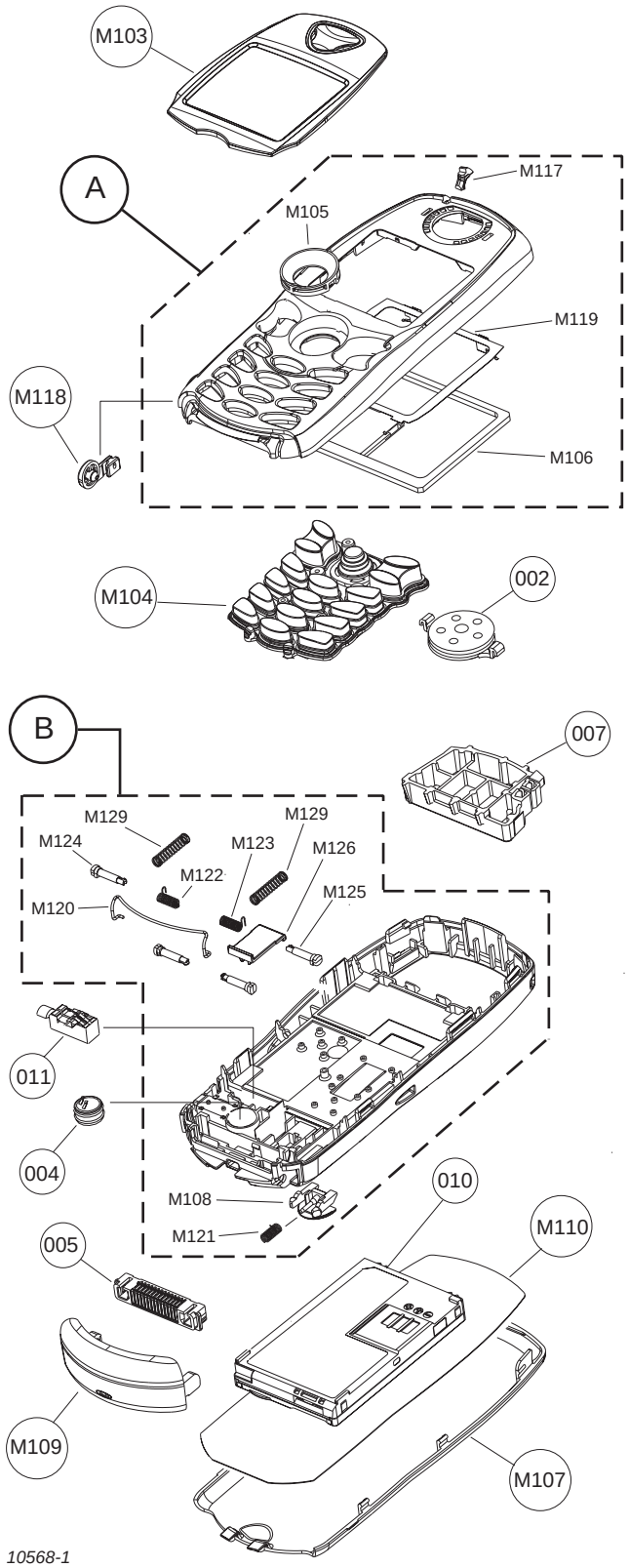
1. On the Interface Box, ensure that the EXT PWR switch is ON. Check that the dummy battery 82 Ohms switch is set to ON.
2. Carry out the instructions described in the main dialogue window.



3. When prompted, measure the dummy battery voltage by connecting a voltmeter to the terminals on the top of the dummy battery.
4. If at any time the message **"Charging Cal failed"**, the calibration procedure has failed. Check all test equipment connections and that the correct resistor has been selected before suspecting a problem with the handset. Further information may be displayed in the dialogue window.
5. When the message **"Charging Cal Done"** is displayed in the dialogue window, the calibration procedure has been completed.

9 REPLACEMENT PARTS LIST

9.1. Case and Cover Parts



Ref. No.	Part No.	Part Name & Description
A	**GD67CVR01R**	**GD67 COVER RED, SERVICE**
A	**GD67CVR01B**	**GD67 COVER BLUE, SERVICE**
	comprising:	
M105		NAVI PANEL GD67
M117		INDICATOR PIPE GD67
M119		SAR SHIELD GD67
B	**GD67CAS01R**	**GD67 CASE RED, SERVICE**
B	**GD67CAS01B**	**GD67 CASE BLUE, SERVICE**
	comprising	
M106		LCD CUSHION
M108		BATTERY HOOK GD67
M120		CASE COVER CLIP GD67
M121		GD30 BATTERY SPRING
M122		SPRING IO COVER LH GD67
M123		SPRING IO COVER RH GD67
M124		PIVOT PIN LH GD67
M125		PIVOT PIN RH GD67
M126		SIM EJECTOR GD67
M129		SPRING IO COVER RELEASE GD67
M130		SPRING IO COVER RELEASE GD67
M103	2EE001AABA	LCD PANEL GD67 BLUE
M104	6TE001AAAA	KEYPAD GD67 BLUE
M104	6TE001AABA	KEYPAD GD67 RED
M107	2NE001AAAA	BATTERY COVER GD67
M109	2PE001AAAA	IO COVER GD67 RED
M118	4CA539BAAA	HSJ CAP GD75
002	HH80003A	RECEIVER SPEAKER SBS1708T-03B
004	9ZA791A	MICROPHONE ASSEMBLY GD92
005	JA76049A	IO CONNECTOR GD75
007	AN80012A	ANTENNA INTERNAL GD67
010	BT80023A	BATTERY GD67, SERVICE ONLY
Z009	6CE001A	INLAY CARD TEMPLATE GD67

Figure 9.1: Case and Cover Parts

9.2. Sub-Assemblies

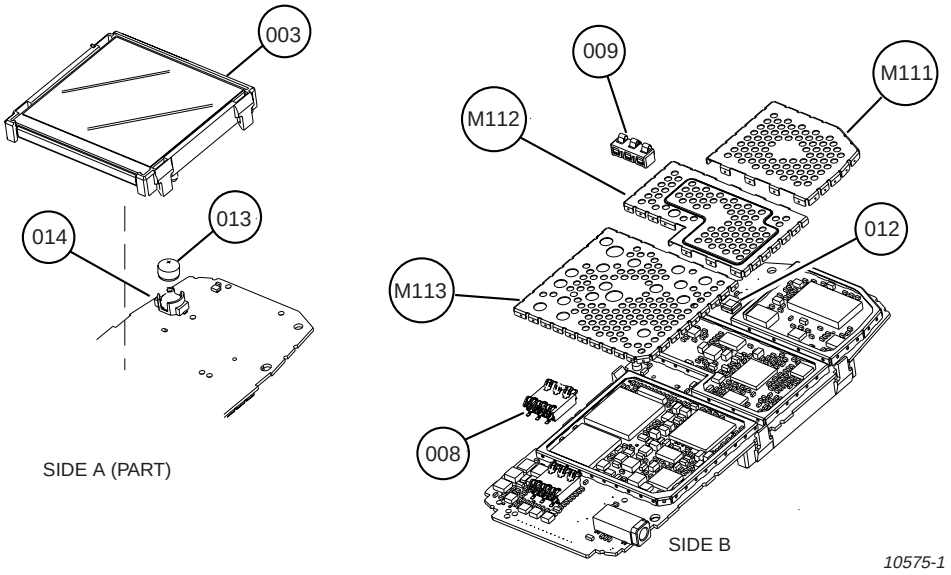


Figure 9.2: Main PCB

Ref. No.	Part No.	Part Name & Description
003	AA80023A	LCD RB191Z MODULE GD67 CSTN
008	JS76006A	CONNECTOR SIM GD95
009	PY76074A	CONNECTOR BATTERY 3 PIN
012	K1QZA1AD0012	CONNECTOR RF COAX
013	ML-421ST/ZT	BATTERY BUTTON CELL
014	JX76004B	HOLDER FOR BACK UP BATTERY
M111	4JE001A	RF SHIELD 1 LID GD67
M112	4JE002A	RF SHIELD 2 LID GD67
M113	4JE003A	BASEBAND SHIELD LID GD67

9.3. PCB Variants

Ref. No.	Part No.	Part Name & Description
D	GD67BRD001A	PCB ASSY LANGUAGE PACK A
D	GD67BRD001B	PCB ASSY LANGUAGE PACK B
D	GD67BRD001C	PCB ASSY LANGUAGE PACK C
D	GD67BRD001D	PCB ASSY LANGUAGE PACK D

Network-specific (SIM-locked) PCB Assemblies are available - please refer to Panasonic spares representative for details.

9.4. PCB Components

Ref. No.	Part No.	Part Name & Description	Grid
C200	F1H1A1050026	CAP CER 1uF 10% 10V	D3
C201	ECUE1E271KBQ	CAP CER 270pF 10% 25V X7R	D3
C202	ECUE1E102KBQ	CAP CER 1nF 10% 25V X7R	D4
C203	F1H1H3910002	CAP CER 390pF 5% 50V	D3
C204	F1H1E102A042	CAP CER 1nF 5% 25V	D3
C205	ECUE1H0R5BCQ	CAP CER 0.5pF 50V +/- 0.1pF NP	D4
C206	ECUE1E271KBQ	CAP CER 270pF 10% 25V X7R	D4
C208	ECUE1H020CCQ	CAP CER 2pF +/-0.25pF 50V NP0	E4
C209	ECJ0EC1H470J	CAP CER 47pF 5% 50V NP0	E4
C210	ECUE1H040CCQ	CAP CER 4pF +/-0.25pF 50V NP0	E3
C211	ECJ0EC1H470J	CAP CER 47pF 5% 50V NP0	E3
C212	ECJ0EC1H470J	CAP CER 47pF 5% 50V NP0	E4
C213	ECUE1C103KBQ	CAP CER 10nF 10% 16V X7R	D3
C215	ECJ0EC1H050C	CAP CER 5pF +/- 0.25pF 50V NP0	D4
C216	ECUE1H040CCQ	CAP CER 4pF +/-0.25pF 50V NP0	E3
C221	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	D4
C222	ECJ0EC1H050C	CAP CER 5pF +/- 0.25pF 50V NP0	D4
C223	ECJ0EC1H220J	CAP CER 22pF 5% 50V NP0	D4
C227	ECUE1H010CCQ	CAP CER 1pF +/-0.25pF 50V NP0	D4
C229	ECUE1C103KBQ	CAP CER 10nF 10% 16V X7R	D4
C232	ECJ0EC1H220J	CAP CER 22pF 5% 50V NP0	E4
C236	ECUE1H040CCQ	CAP CER 4pF +/-0.25pF 50V NP0	D4
C237	ECUE1H040CCQ	CAP CER 4pF +/-0.25pF 50V NP0	D4
C240	F1G1C3330001	CAP CER 33nF 10% 16V X5R	C4
C241	ECJ0EC1H101J	CAP CER 100pF 5% 50V NP0	C4
C242	ECJ0EC1H560J	CAP CER 56pF 5% 50V NP0	C4
C243	ECUE1C103KBQ	CAP CER 10nF 10% 16V X7R	D4
C244	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C4
C246	ECUE1E102KBQ	CAP CER 1nF 10% 25V X7R	D4
C247	ECJ0EC1H680J	CAP CER 68pF 5% 50V NP0	C4
C248	ECJ0EC1H680J	CAP CER 68pF 5% 50V NP0	D4
C249	F1G1A104A012	CAP CER 100nF 10% 10V X5R	D4
C250	ECUE1E271KBQ	CAP CER 270pF 10% 25V X7R	D4
C251	ECUE1E271KBQ	CAP CER 270pF 10% 25V X7R	D4
C262	F1G1H180A409	CAP CER 18pF 5% 50V NP0	D3
C263	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	D3
C264	ECJ0EC1H560J	CAP CER 56pF 5% 50V NP0	D3
C265	F1G1H4R7A490	CAP CER 4.7pF +/- 0.1pF 50V NP	D4
C267	F1G1H4R7A490	CAP CER 4.7pF +/- 0.1pF 50V NP	D4
C268	ECJ0EC1H030C	CAP CER 3pF +/- 0.25pF 50V NP0	D4
C268	ERJ2GEJ681X	RES 680 OHM 5% 1/16W	D4
C270	ECHU1C103JX5	CAP FILM 10nF 5% 16V	D4
C271	ECJ0EC1H050C	CAP CER 5pF +/- 0.25pF 50V NP0	C4
C271	ERJ2GEJ681X	RES 680 OHM 5% 1/16W	C4
C272	ECJ0EC1H050C	CAP CER 5pF +/- 0.25pF 50V NP0	C4
C273	ECJ0EC1H050C	CAP CER 5pF +/- 0.25pF 50V NP0	D4
C274	ECJ0EC1H050C	CAP CER 5pF +/- 0.25pF 50V NP0	D4
C279	ECUE1E102KBQ	CAP CER 1nF 10% 25V X7R	D3
C281	ECJ0EC1H220J	CAP CER 22pF 5% 50V NP0	D3
C282	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	E4
C283	ECUE1H020CCQ	CAP CER 2pF +/-0.25pF 50V NP0	E4
C284	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C4
C285	ECJ0EC1H100D	CAP CER 10pF +/-0.5pF 50V NP0	E3
C286	F1J0J225A002	CAP CER 2.2uF 10% 6.3V X7R	D3
C287	F1J0J225A002	CAP CER 2.2uF 10% 6.3V X7R	D3
C288	ECJ1VB1H102K	CAP CER 1nF 10%	E3
C289	F1H1A1050026	CAP CER 1uF 10% 10V	D3
C290	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	D3
C291	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	D3
C292	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	D3
C295	ECUE1H010CCQ	CAP CER 1pF +/-0.25pF 50V NP0	D4
C296	ECJ0EC1H330J	CAP CER 33pF 5% 50V NP0	D3
C297	ECJ0EC1H100D	CAP CER 10pF +/-0.5pF 50V NP0	E4
C298	ECUE1H020CCQ	CAP CER 2pF +/-0.25pF 50V NP0	D4
C299	ECUE1H020CCQ	CAP CER 2pF +/-0.25pF 50V NP0	D4
C600	F1G1H120A409	CAP CER 12pF 5% 50V NP0	C3
C601	F1G1H120A409	CAP CER 12pF 5% 50V NP0	C3
C602	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C3
C603	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C3
C604	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C3
C605	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C3
C606	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B3
C607	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B3
C608	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B3
C609	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B3
C620	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C4
C621	F1H1A1050026	CAP CER 1uF 10% 10V	C4
C622	F1G1C2230001	CAP CER 22nF 10% 16V X7R	A3
C623	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	B4
C624	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	C4
C625	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	C4
C626	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	B4
C627	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	C4
C628	F1H1A1050026	CAP CER 1uF 10% 10V	C4
C629	F1H1A1050026	CAP CER 1uF 10% 10V	C4
C630	ECJ0EC1H470J	CAP CER 47pF 5% 50V NP0	C4
C631	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	C3
C632	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C640	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B3
C641	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B3
C700	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C3
C701	F1G1H150A409	CAP CER 15pF 5% 50V NP0	C3
C715	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	B4
C716	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B4
C717	ECST0GZ226R	CAP TANT 22uF 20% 4V	B4
C719	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C720	ECJ0EC1H101J	CAP CER 100pF 5% 50V NP0	A3
C723	F1G1A104A012	CAP CER 100nF 10% 10V X5R	A3
C730	F1H1A1050026	CAP CER 1uF 10% 10V	C3
C731	F1H1A1050026	CAP CER 1uF 10% 10V	B3
C732	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C733	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C748	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C749	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C754	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C755	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	B4
C756	ECJ0EC1H101J	CAP CER 100pF 5% 50V NP0	B4
C757	F1H1A1050026	CAP CER 1uF 10% 10V	B4
C758	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B4
C759	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B4
C760	F1G1A104A012	CAP CER 100nF 10% 10V X5R	C4
C764	F1G1C3330001	CAP CER 33nF 10% 16V X5R	C4
C765	F1G1C3330001	CAP CER 33nF 10% 16V X5R	C4
C766	F1J1A4750006	CAP CER 4.7uF 10% 10V X7R	B4
C782	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B4

Ref. No.	Part No.	Part Name & Description	Grid
C785	ECJ0EC1H101J	CAP CER 100pF 5% 50V NP0	A3
C786	F1G1A104A012	CAP CER 100nF 10% 10V X5R	B4
CN201	K1QZA1AD0012	CONNECTOR RF COAX	E3
CN620	JX76004B	HOLDER, BACK UP BATTERY	A2
CN700	PY76074A	CONNECTOR BATTERY 3 PIN	C3
CN710	JC76001A	CONNECTOR AUDIO JACK SKT	A4
CN720	JS76006A	CONNECTOR SIM GD95	A3
CN730	K1MZ18B00005	CONNECTOR 18 WAY	
D200	B0CCAB000030	DIODE BBY58-02V TUNING 10V	C4
D620	B0JCMC000004	DIODE RB491DT146 SCHOTTKY	A3
D621	B0JDCD000003	DIODE RB531XN SCHOTTKY	B4
D700	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	E1
D701	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	D2
D702	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	D1
D703	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	D2
D704	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	D1
D705	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	E2
D706	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	C2
D707	LNJ312G8J0MC	DIODE LNJ312G8J0MC LED 2	C1
D708	MAZS0750ML	DIODE MAZS0750ML ZENER 7.5V	C3
D709	MAZS0750ML	DIODE MAZS0750ML ZENER 7.5V	C3
D710	MAZS0470GL	DIODE MAZS0470G ZENER 4.7V	B4
D711	MAZS0470GL	DIODE MAZS0470G ZENER 4.7V	A4
D713	LNJ115W8PRA	DIODE LED GREEN/RED 10mA	A2
D720	MA2S11100L	DIODE MA2S111 SWITCHING 80V	A3
D721	B0BD6R800004	DIODE UMZ6.8EN ZENER 6.8V	A3
D728	B0JCDC000001	DIODE RB520S-30 SCHOTTKY 30V	
D731	MA2S11100L	DIODE MA2S111 SWITCHING 80V	B4
D750	MAZS0750ML	DIODE MAZS0750ML ZENER 7.5V	A2
D751	MAZS0750ML	DIODE MAZS0750ML ZENER 7.5V	A2
D760	MAZS0470GL	DIODE MAZS0470G ZENER 4.7V	A3
D761	MAZS0470GL	DIODE MAZS0470G ZENER 4.7V	A3
D780	B0JDCD000003	DIODE RB531XN SCHOTTKY	A3
D781	B0JDCD000003	DIODE RB531XN SCHOTTKY	A3
D783	MAZS0750ML	DIODE MAZS0750ML ZENER 7.5V	E2
D784	MAZS0750ML	DIODE MAZS0750ML ZENER 7.5V	E1
D785	B0BD6R800004	DIODE UMZ6.8EN ZENER 6.8V	A3
D786	B0BD6R800004	DIODE UMZ6.8EN ZENER 6.8V	A3
E100	B9Z000000018	COUPLER 897.5 MHz	E3
E101	EHFFD1729	COUPLER 1.747 GHz	E3
FL201	EFCH897MMTE7	FILTER SAW TX 897.5MHz	E4
FL203	EFCHS9418MT2	FILTER RX SAW GSM/PCN	E4
L200	ELJRF6N8JF2	INDUCTOR 6.8nH 5%	D4
L201	ELJRF6N8JF2	INDUCTOR 6.8nH 5%	D4
L202	ELJRF12NJF2	INDUCTOR 12nH 5%	D4
L203	ELJRF12NJF2	INDUCTOR 12nH 5%	D4
L207	ELJRFR10JF2	INDUCTOR 100nH 5%	D4
L208	ELJRFR10JF2	INDUCTOR 100nH 5%	D4
L209	ELJRF47NJF2	INDUCTOR 47nH 5%	D4
L210	ELJRF47NJF2	INDUCTOR 47nH 5%	D4
L211	ELJRF22NJF2	INDUCTOR 22nH 5%	D4
L212	ELJRF22NJF2	INDUCTOR 22nH 5%	D4
L213	ELJRF6N8JF2	INDUCTOR 6.8nH 5%	D4
L214	ELJRF6N8JF2	INDUCTOR 6.8nH 5%	D4
L216	G1C1R0JA0021	INDUCTOR 1uH 5%	D3
L219	ELJRF56NJF2	INDUCTOR 56nH 5%	D4
L221	EXCML16A270U	SUPPRESSOR EMI 27 OHM 4A	E4

Ref. No.	Part No.	Part Name & Description	Grid
L223	ELJRF4N7DF2	INDUCTOR 4.7nH +/-0.3nH	E4
L226	ELJRF12NJF2	INDUCTOR 12nH 5%	D4
L227	ELJRF3N9JF2	INDUCTOR 3.9nH 5%	E4
L228	ELJRF10NJF2	INDUCTOR 10nH 5%	E3
L230	ELJRF3N9DF2	INDUCTOR 3.9nH +/- 0.3nH	E3
L233	ELJRF39NJF2	INDUCTOR 39nH 5%	E3
L279	ELJRF3N3DF2	INDUCTOR 3.3nH +/-0.3nH	
L712	J0JAC0000011	SUPPRESSOR EMI FERRITE 1K	A4
L713	J0JAC0000011	SUPPRESSOR EMI FERRITE 1K	A4
L731	G1C82NJ00010	INDUCTOR 82nH 5%	B4
L750	G1C82NJ00010	INDUCTOR 82nH 5%	A2
L751	G1C82NJ00010	INDUCTOR 82nH 5%	A2
L752	G1C82NJ00009	INDUCTOR 82nH 5%	B4
L753	J0JAC0000011	SUPPRESSOR EMI FERRITE 1K	
L754	J0JAC0000011	SUPPRESSOR EMI FERRITE 1K	
M114	4JE004A	RF SHIELD 1 FRAME GD67	
M115	4JE005A	RF SHIELD 2 FRAME GD67	
M116	4JE006B	BASEBABD SHIELD FRAME GD67	
Q200	XP0411200L	TRANSISTOR XP04112 DUAL PNP 1K	D3
Q620	B1CHQC000001	TRANSISTOR UPA1915TE-T1	A3
Q700	B1GFGCAA0001	TRANSISTOR IMX9T110	A3
Q730	B1CHDD000001	TRANSISTOR HAT3016G-EL	B3
Q732	B1GFGCAA0001	TRANSISTOR IMX9T110	B4
Q780	B1GFGCAA0001	TRANSISTOR IMX9T110	B4
Q781	B1GDCFEM0004	TRANSISTOR DTA123JUA PNP	B3
R200	ERJ2GEF222X	RES 2.2K OHM 1% 1/16W	D4
R201	ERJ2RKF182X	RES 1.8K OHM 1% 1/16W	D4
R203	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	D3
R205	ERJ2GEJ122X	RES 1.2K OHM 5% 1/16W	D3
R206	ERJ2GEJ122X	RES 1.2K OHM 5% 1/16W	D3
R207	ERJ2GEJ152X	RES 1.5K OHM 5% 1/16W	D3
R208	ERJ2GEJ223X	RES 22K OHM 5% 1/16W	D3
R209	ERJ2GEJ103X	RES 10K OHM 5% 1/16W	D3
R210	ERJ2GEJ101X	RES 100 OHM 5% 1/16W	E4
R211	ERJ2GEJ271X	RES 270 OHM 5% 1/16W	E3
R212	ERJ2GEJ680X	RES 68 OHM 5% 1/16W	E3
R213	ERJ2GEJ221X	RES 220 OHM 5% 1/16W	E3
R214	ERJ2GEJ680X	RES 68 OHM 5% 1/16W	E3
R215	ERJ2GEJ470X	RES 47 OHM 5% 1/16W	E3
R216	ERJ2GEJ470X	RES 47 OHM 5% 1/16W	E3
R217	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	D4
R218	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	D4
R220	ERJ2GEJ122X	RES 1.2K OHM 5% 1/16W	D4
R221	ERJ2RKF123X	RES 12K OHM 1% 1/16W	D4
R222	ERJ2GEJ104X	RES 100K OHM 5% 1/16W	C4
R224	ERJ2GEJ390X	RES 39 OHM 5% 1/16W	C4
R226	ERJ2GEJ271X	RES 270 OHM 5% 1/16W	D4
R231	ERJ2GEJ472X	RES 4.7K OHM 5% 1/16W	C4
R234	ERJ2GEJ680X	RES 68 OHM 5% 1/16W	E3
R251	ERJ2GEJ470X	RES 47 OHM 5% 1/16W	D3
R266	ERJ2GEJ181X	RES 180 OHM 5% 1/16W	E4
R267	ERJ2GEJ330X	RES 33 OHM 5% 1/16W	E4
R269	ERJ2GEJ8R2X	RES 8.2 OHM 5% 1/16W	E4
R270	ERJ2GEJ181X	RES 180 OHM 5% 1/16W	E4
R273	ERJ2RKF472X	RES 4.7K OHM 1% 1/16W	D4
R275	ERJ2GEJ472X	RES 4.7K OHM 5% 1/16W	D4
R276	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	E3
R278	ERJ2GEJ182X	RES 1.8K OHM 5% 1/16W	D4

Ref. No.	Part No.	Part Name & Description	Grid
R280	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	D3
R281	ERJ2GEJ101X	RES 100 OHM 5% 1/16W	D3
R600	ERJ2GEJ472X	RES 4.7K OHM 5% 1/16W	C3
R601	ERJ2GEJ104X	RES 100K OHM 5% 1/16W	C3
R620	ERJ2GEF104X	RES 100K OHM 1% 1/16W	C4
R621	ERJ6RSFR15V	RES 0.15 OHM 1% 1/10W	B3
R622	ERJ6GEYJ220V	RES 22 OHM 5% 1/10W	B4
R623	ERJ2GEF473X	RES 47K OHM 1% 1/16W	B4
R624	ERJ6GEYJ220V	RES 22 OHM 5% 1/10W	A3
R625	ERJ2GEJ222X	RES 2.2K OHM 5% 1/16W	B4
R626	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	C4
R700	ERJ2GEJ152X	RES 1.5K OHM 5% 1/16W	A3
R701	ERJ14YJ150U	RES 15 OHM 5% 1/4W	A3
R702	ERJ2GEJ181X	RES 180 OHM 5% 1/16W	A2
R703	ERJ2GEJ561X	RES 560 OHM 5% 1/16W	A2
R704	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	C3
R705	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	A3
R710	ERJ2GEJ103X	RES 10K OHM 5% 1/16W	B4
R711	ERJ2GEJ104X	RES 100K OHM 5% 1/16W	B4
R712	ERJ2GEJ152X	RES 1.5K OHM 5% 1/16W	B4
R713	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	B4
R715	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	B4
R716	ERJ2GEJ223X	RES 22K OHM 5% 1/16W	B4
R717	ERJ2GEJ822X	RES 8.2K OHM 5% 1/16W	B4
R720	ERJ2GEJ472X	RES 4.7K OHM 5% 1/16W	A3
R721	ERJ2GEJ472X	RES 4.7K OHM 5% 1/16W	A3
R722	ERJ2GEJ470X	RES 47 OHM 5% 1/16W	B3
R723	ERJ2GEJ822X	RES 8.2K OHM 5% 1/16W	A3
R733	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R734	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R735	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R736	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R737	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R738	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R739	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R741	ERJ2GEJ181X	RES 180 OHM 5% 1/16W	C3
R742	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R743	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R744	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R745	ERJ2GEJ330X	RES 33 OHM 5% 1/16W	B4
R747	ERJ2GEJ102X	RES 1K OHM 5% 1/16W	C3
R748	ERJ2GEJ332X	RES 3.3K OHM 5% 1/16W	B4
R749	ERJ2GEJ332X	RES 3.3K OHM 5% 1/16W	B4
R750	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	B4
R751	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	B4
R752	ERJ2GEJ332X	RES 3.3K OHM 5% 1/16W	B4
R755	ERJ2GEJ272X	RES 2.7K OHM 5% 1/16W	B4
R756	ERJ2GEJ272X	RES 2.7K OHM 5% 1/16W	B4
R757	ERJ2GEJ332X	RES 3.3K OHM 5% 1/16W	B4
R758	ERJ2GEJ104X	RES 100K OHM 5% 1/16W	B4
R760	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	C4
R761	ERJ2GEJ152X	RES 1.5K OHM 5% 1/16W	C4
R762	ERJ2GEJ152X	RES 1.5K OHM 5% 1/16W	C4
R763	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	C4
R764	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	A3
R765	ERJ2GE0R00X	RES JUMPER 0 OHM 1A	A3
R780	ERJ2GEJ104X	RES 100K OHM 5% 1/16W	A3
R781	ERJ2GEJ103X	RES 10K OHM 5% 1/16W	A3
R782	ERJ2GEJ103X	RES 10K OHM 5% 1/16W	A3
R783	ERJ2GEJ103X	RES 10K OHM 5% 1/16W	A3
R784	ERJ2GEJ104X	RES 100K OHM 5% 1/16W	A3
R785	ERJ2GEJ472X	RES 4.7K OHM 5% 1/16W	B4
R786	ERJ6GEYJ2R2V	RES 2.2 OHM 5% 1/10W	B3
R790	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R791	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	C3
R792	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R793	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R794	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R795	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R796	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R797	ERJ2GEJ331X	RES 330 OHM 5% 1/16W	A3
R799	ERJ2GEJ152X	RES 1.5K OHM 5% 1/16W	A3
RT201	ERTJ0ER333H	THERMISTOR 33K OHM +/- 3%	C4
S201	K0ZZ00000604	ANTENNA SWITCH GSM / DCS	E3
U200	C1CB00001477	IC PMB6255V V1.1 DUAL BAND TX	D4
U202	C1CB00001024	IC AD8315ARM GSM PA CONTR	D3
U203	C5CB00000047	PA PF08122BS-03-TB DUAL / DCS	
U204	C0DBZFC00038	I C R5323N001B REGULATOR 2.8V	D3
U205	C1CB00001476	IC PMB2256V V1.1 DUAL BAND	D4
U730	C0JBAE000087	IC TC7S32FU 2 INPUT OR GATE	C3
U750	C1BB00000718	IC LM4895MMX AUDIO AMP 1W	B4
U751	C1CB00001385	IC BU8772KN MELODY 16 TONE	B4
Y200	H0J260500002	CRYSTAL 26MHz 10pF	C4
Y600	H0J327200079	CRYSTAL 32.768KHz 7pF 100PPM	C3

9.5. Refurbishment Kits

Ref. No.	Part No.	Part Name & Description
	9RD75S	REFURBISHMENT KIT, SILVER
	9RD75K	REFURBISHMENT KIT, BLACK

9.6. Jigs and Tools

Ref. No.	Part No.	Part Name & Description
	IFB004	CHANNEL / INTERFACE BOX
	JT00010	BATTERY CALIBRATION UNIT (BCVCU)
	JT00043	GD52 /GD92 INTERFACE CABLE
	JT00059	CASE SEPARATION TOOL
	JT00082	PCB REPAIR JIG
	JT00085	GD67 CLIP REMOVAL TOOL
	JT00083	GD67 TEST / DUMMY BATTERY
	JT00037	SCREWDRIVER

9.7. Document Packs

Ref. No.	Part No.	Part Name & Description
	GD67DPK01	ARABIC
	GD67DPK02	CZECH
	GD67DPK03	DANISH, GERMAN, EU WARRANTY
	GD67DPK04	DANISH, EU WARRANTY
	GD67DPK05	DUTCH, FRENCH, GERMAN, EU WARRANTY
	GD67DPK06	DUTCH, EU WARRANTY
	GD67DPK07	SLOVAK
	GD67DPK08	FRENCH
	GD67DPK09	GERMAN, EU WARRANTY
	GD67DPK10	ENGLISH, PUK
	GD67DPK11	ENGLISH, EU WARRANTY
	GD67DPK12	ENGLISH
	GD67DPK13	FINNISH, EU WARRANTY
	GD67DPK15	FRENCH, EU WARRANTY
	GD67DPK16	GERMAN, EU WARRANTY
	GD67DPK17	GREEK, EU WARRANTY
	GD67DPK18	HUNGARIAN
	GD67DPK19	ITALIAN, EU WARRANTY
	GD67DPK20	NORWEGIAN, EU WARRANTY
	GD67DPK21	POLISH
	GD67DPK22	PORTUGUESE, EU WARRANTY
	GD67DPK23	RUSSIAN
	GD67DPK24	SPANISH, EU WARRANTY
	GD67DPK25	SWEDISH, EU WARRANTY
	GD67DPK26	TURKISH, EU WARRANTY
	GD67DPK33	FRENCH, GERMAN

10 CIRCUIT DIAGRAMS

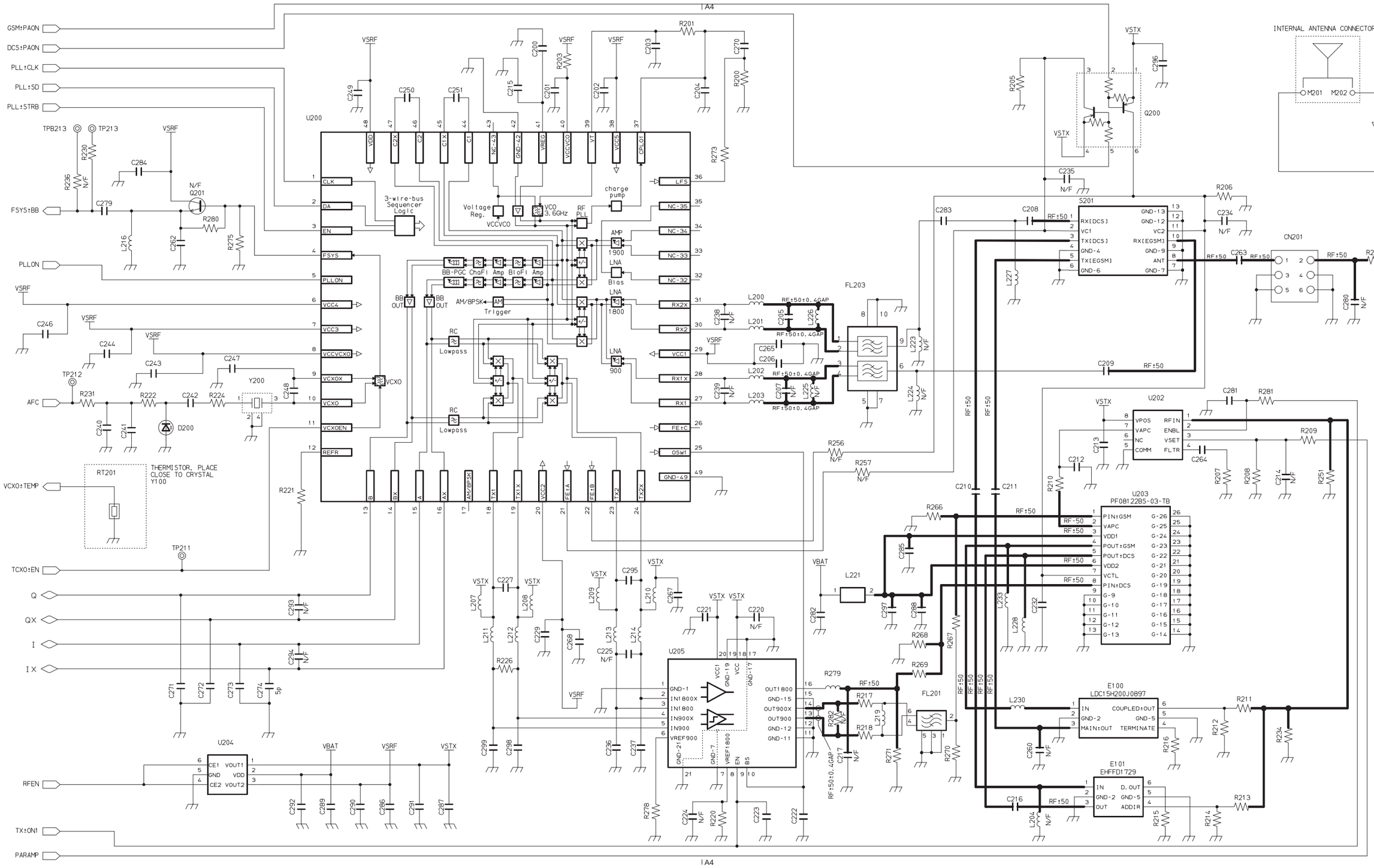


Figure 10.1: Circuit Diagram - RF

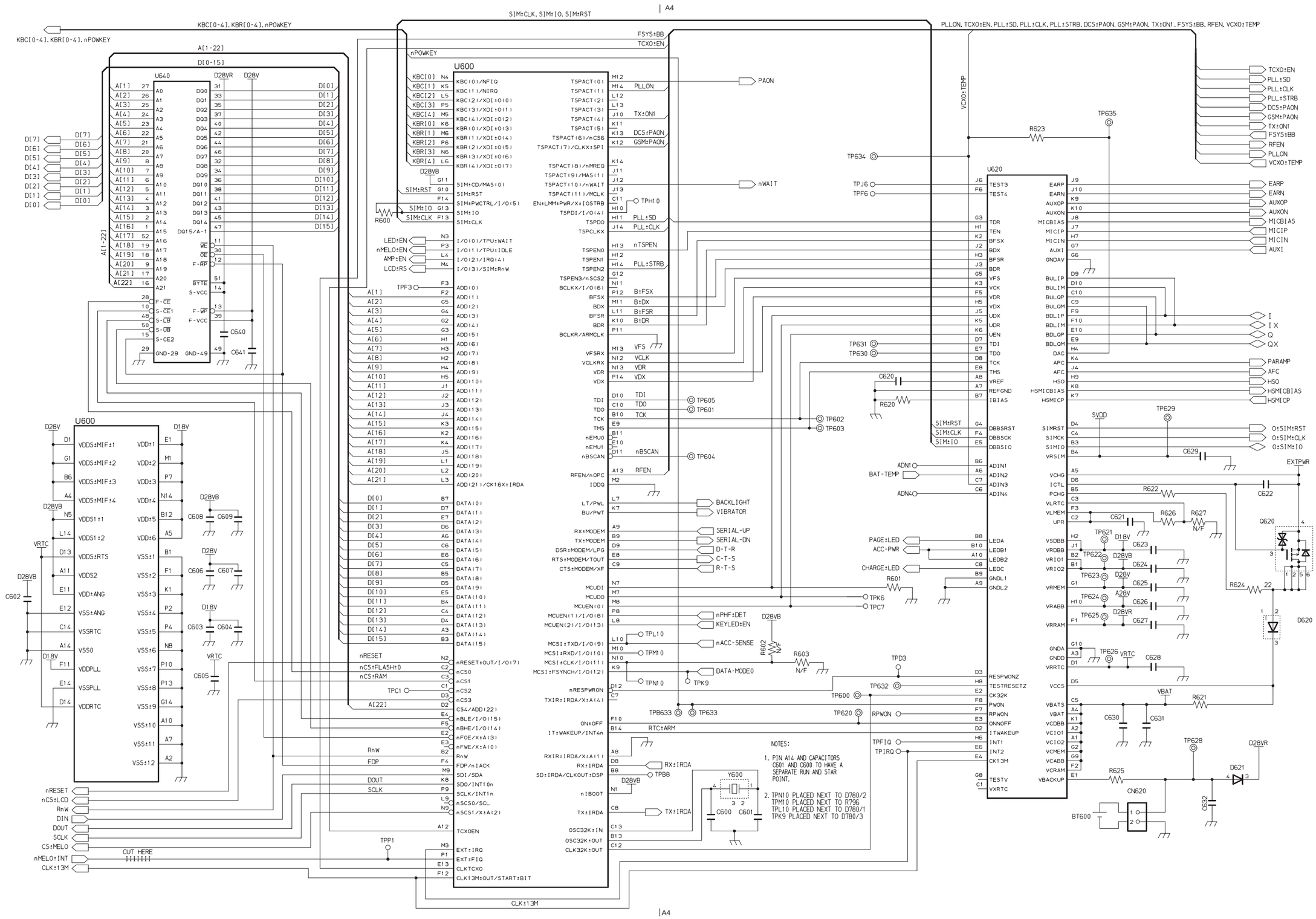


Figure 10.2: Circuit Diagram - Baseband

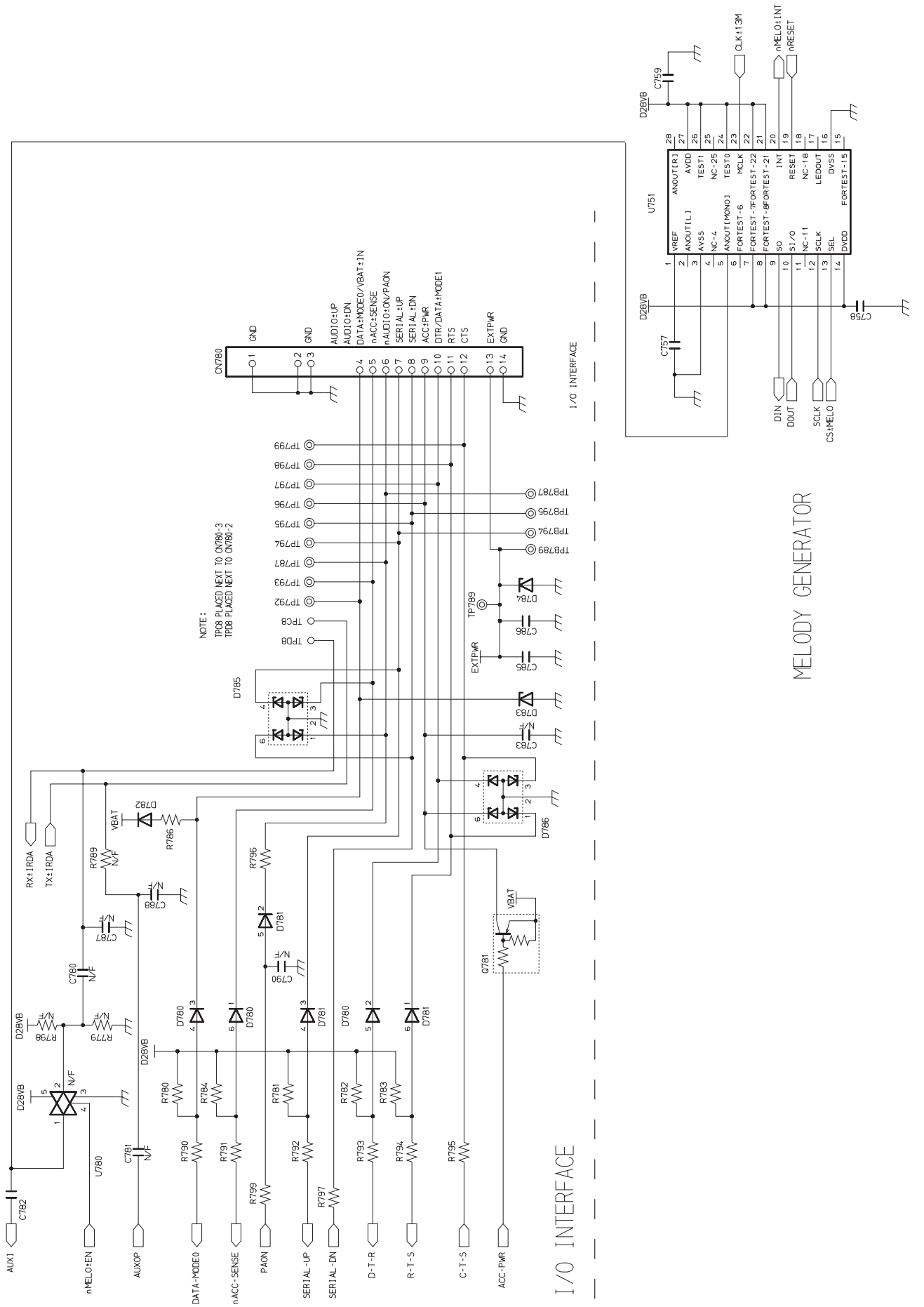


Figure 10.3: Circuit Diagram - I/O Interface and Melody Generator

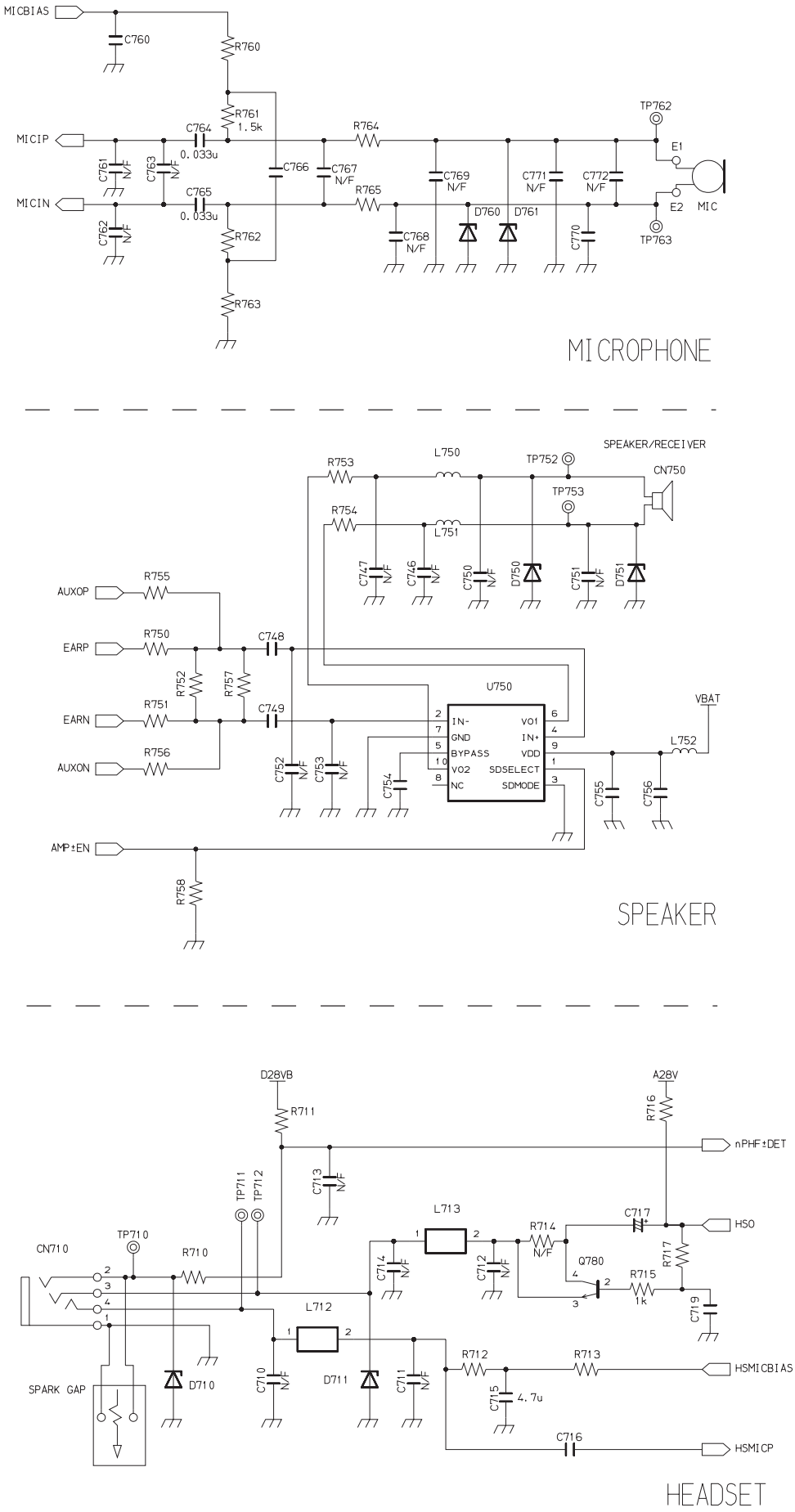
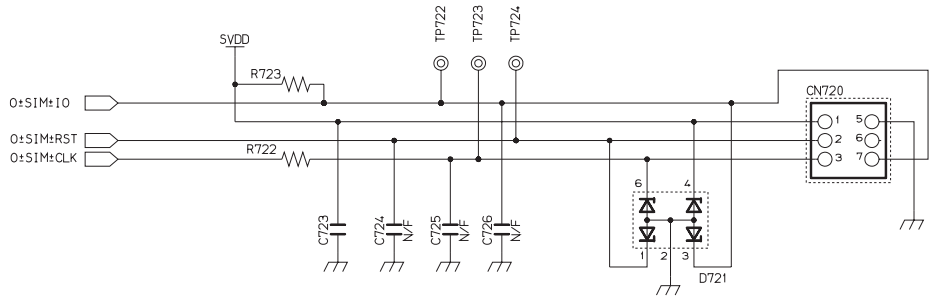
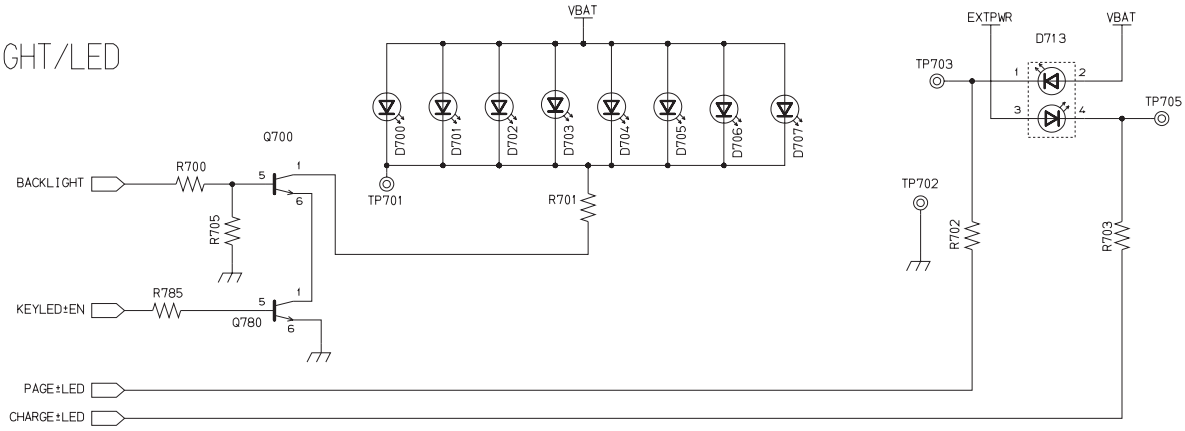


Figure 10.4: Circuit Diagram - Audio Interfaces

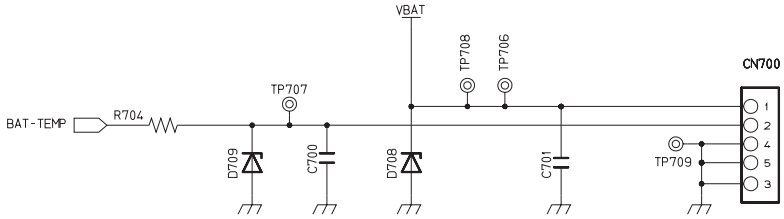
SIM



BACKLIGHT/LED



BATTERY CONNECTOR



VIBRATOR

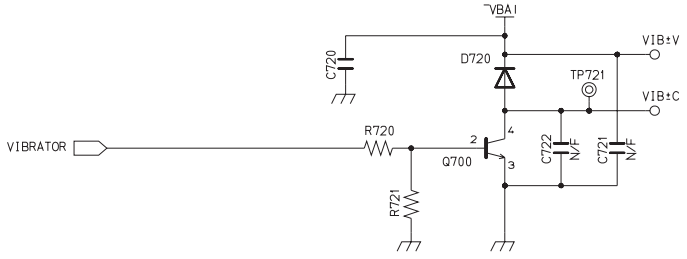
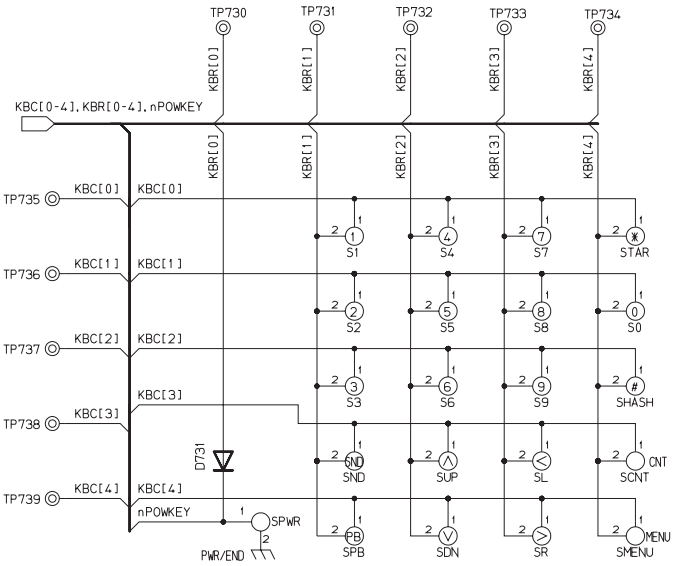


Figure 10.5: Circuit Diagram - Peripherals 1 of 2

KEYPAD



LCD INTERFACE

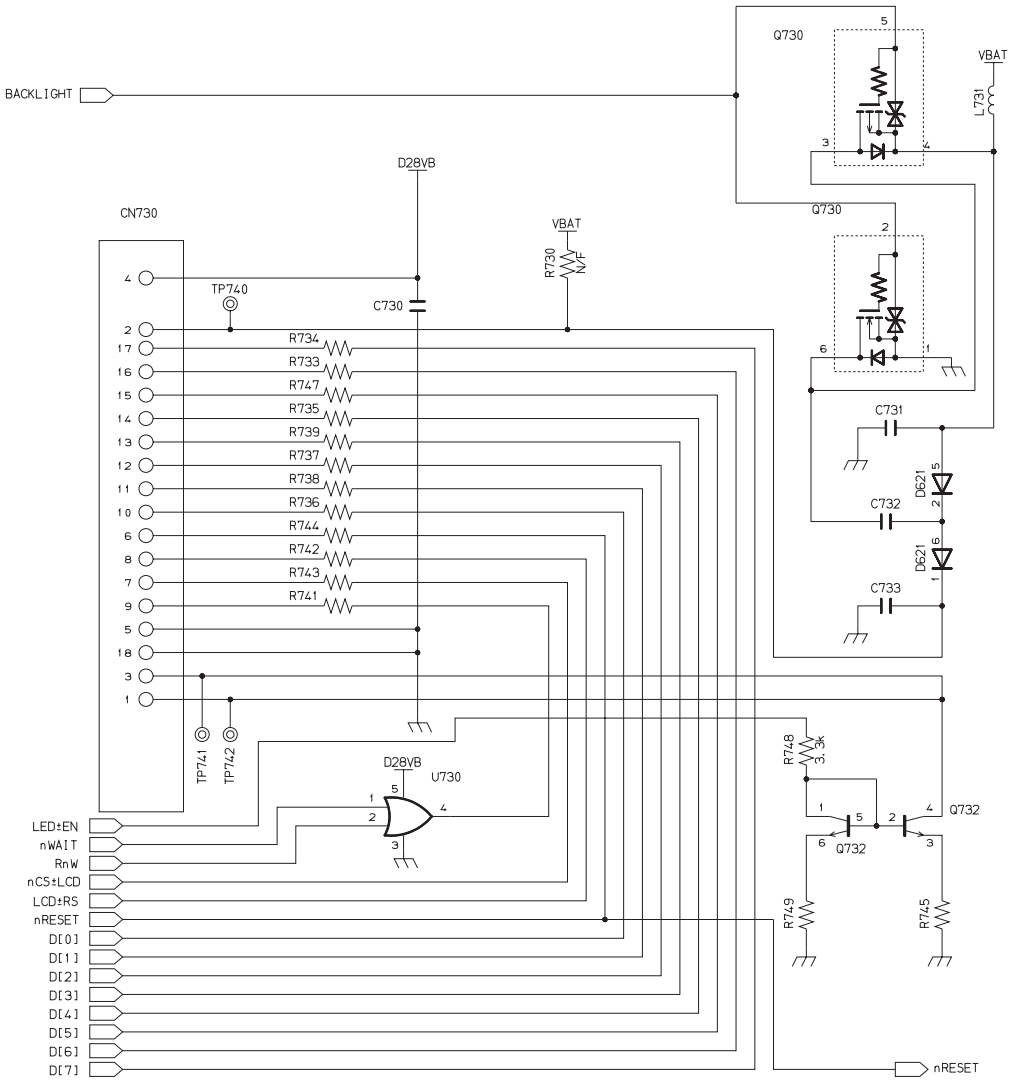


Figure 10.6: Circuit Diagram - Peripherals 2 of 2

11 LAYOUT DIAGRAMS

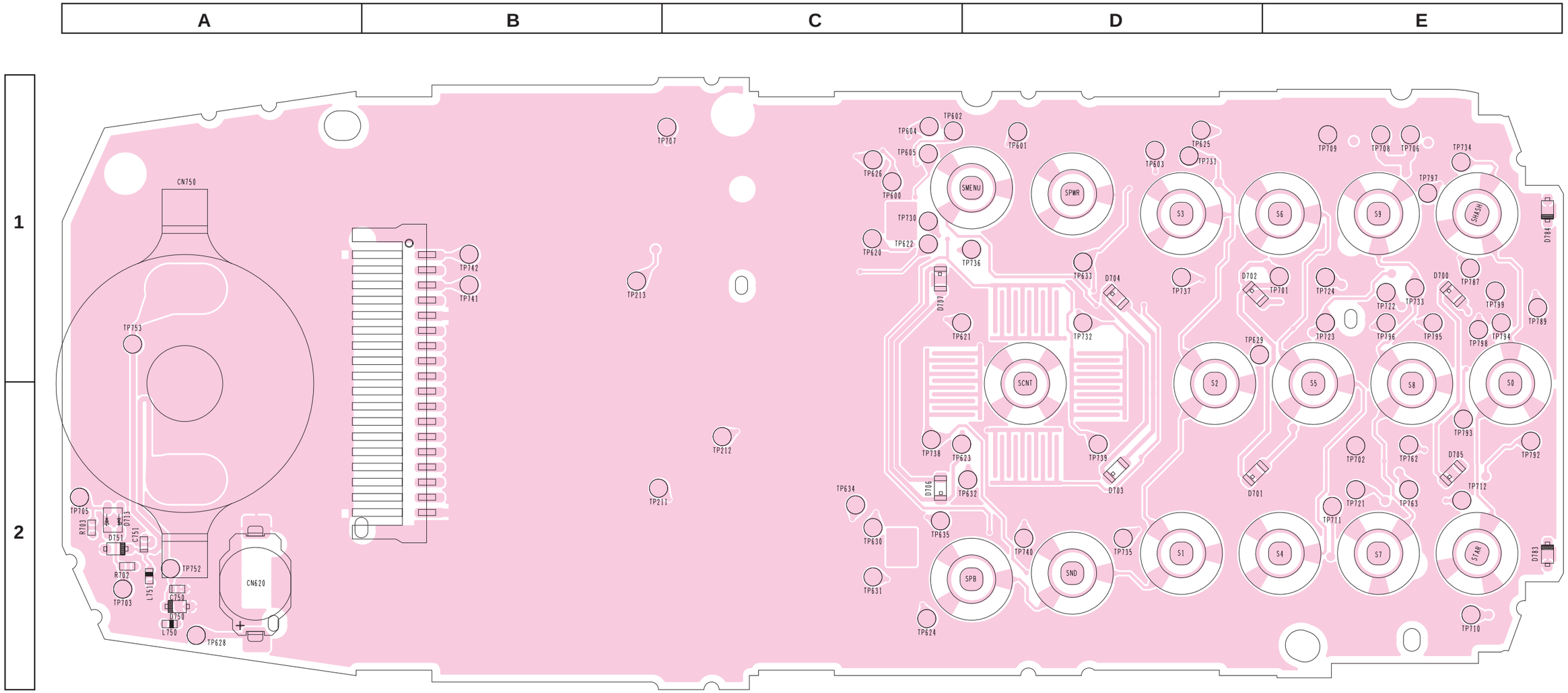


Figure 11.1: PCB Layout - Side A

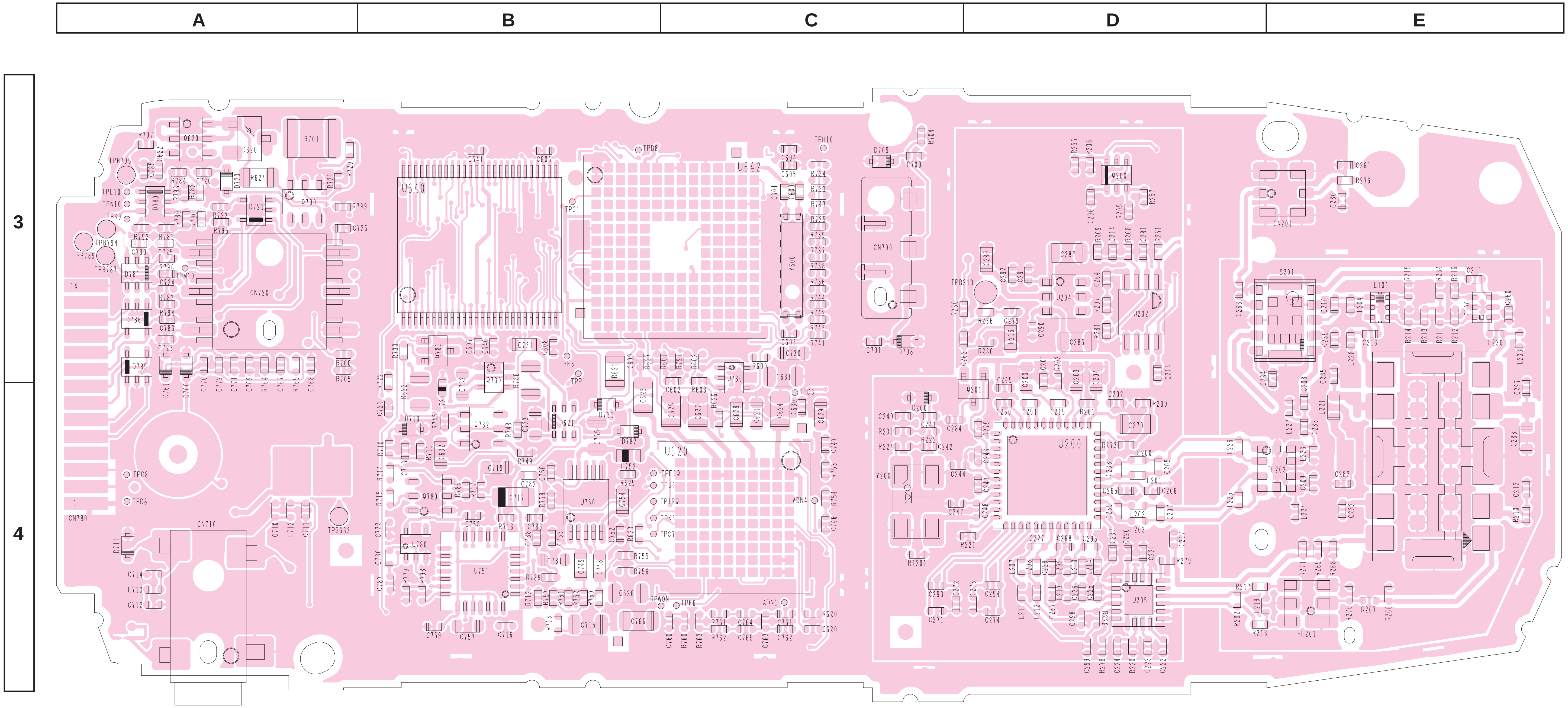


Figure 11.2: PCB Layout - Side B

10 CIRCUIT DIAGRAMS

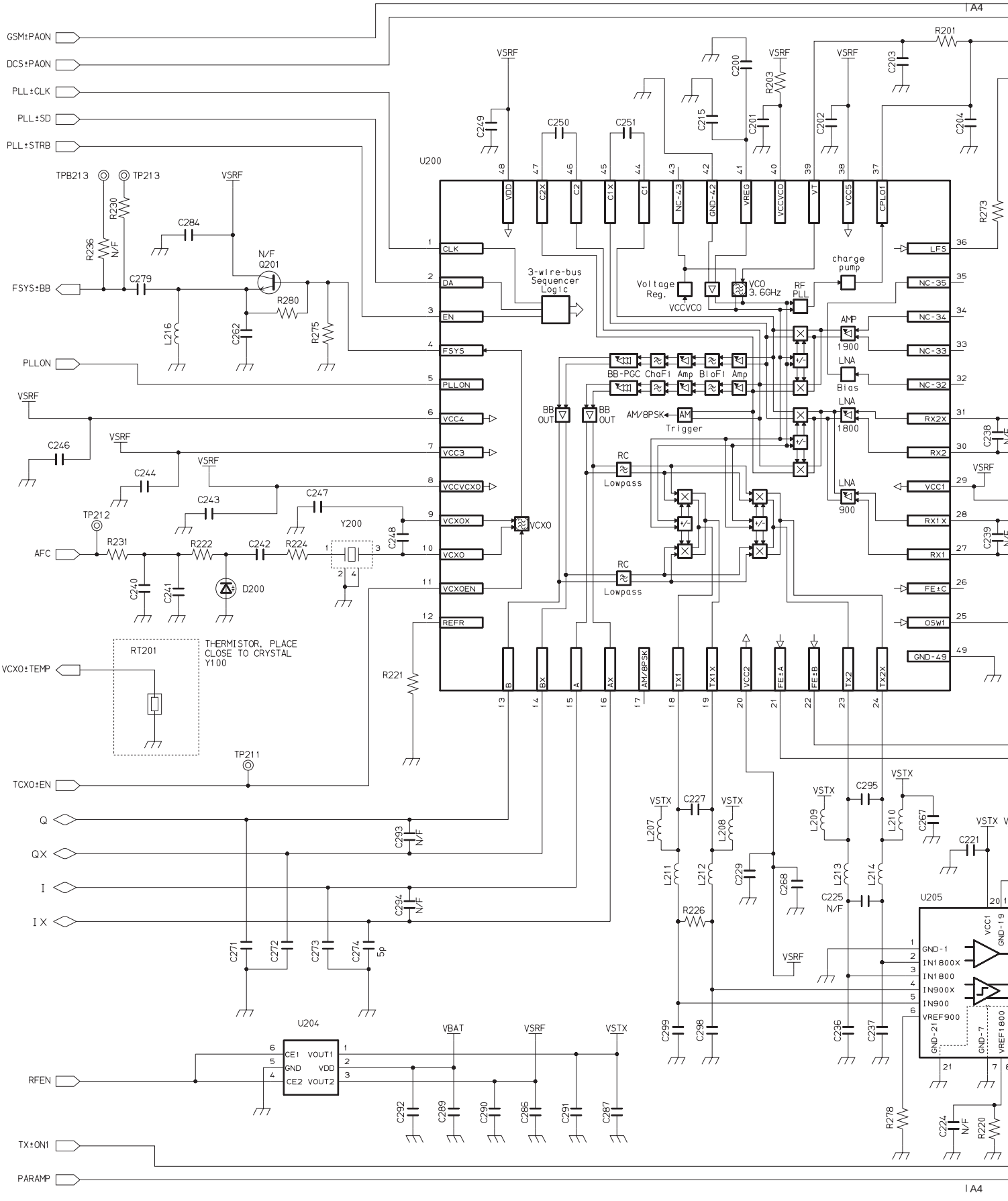
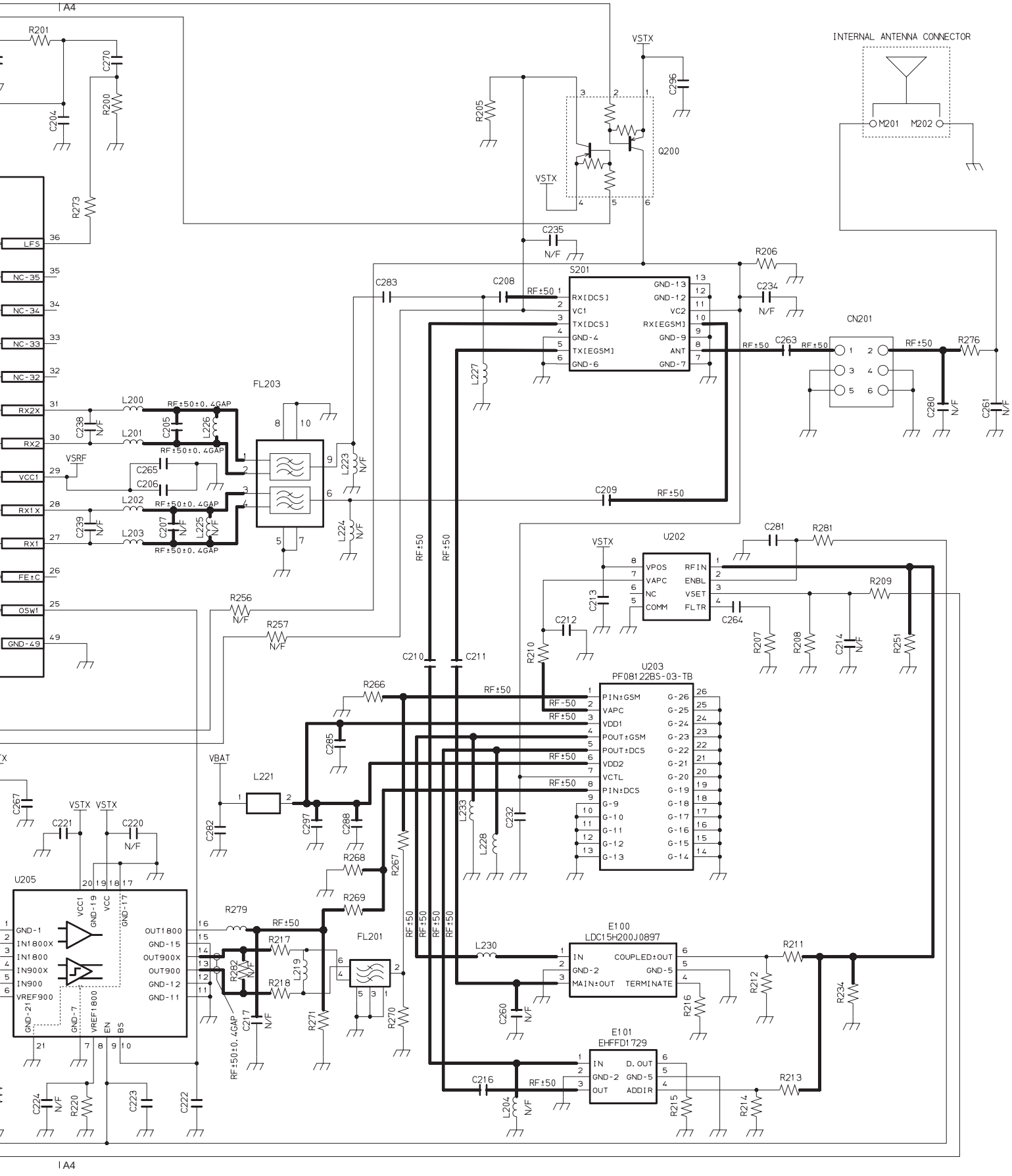


Figure 10.1: Circuit D



0.1: Circuit Diagram - RF

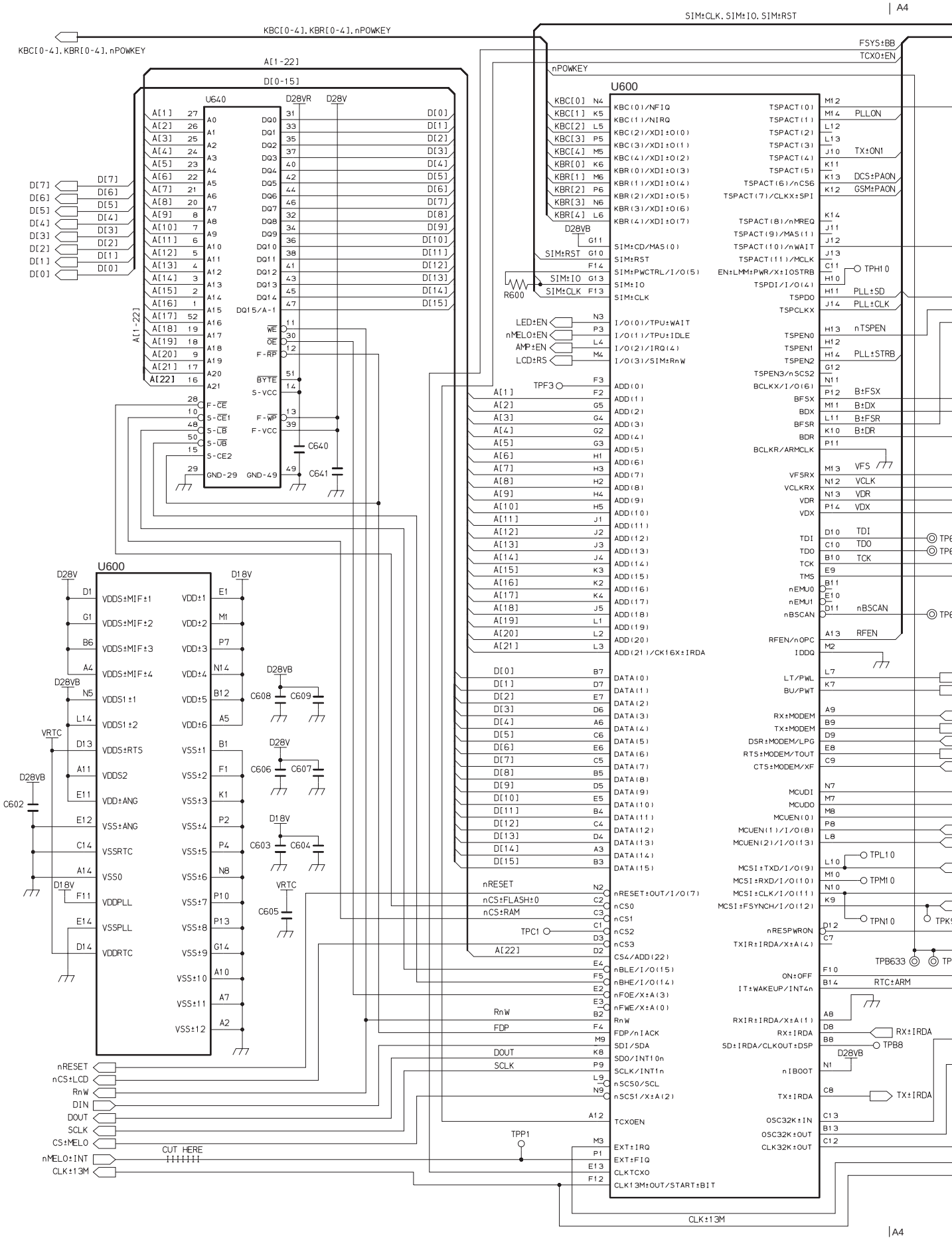
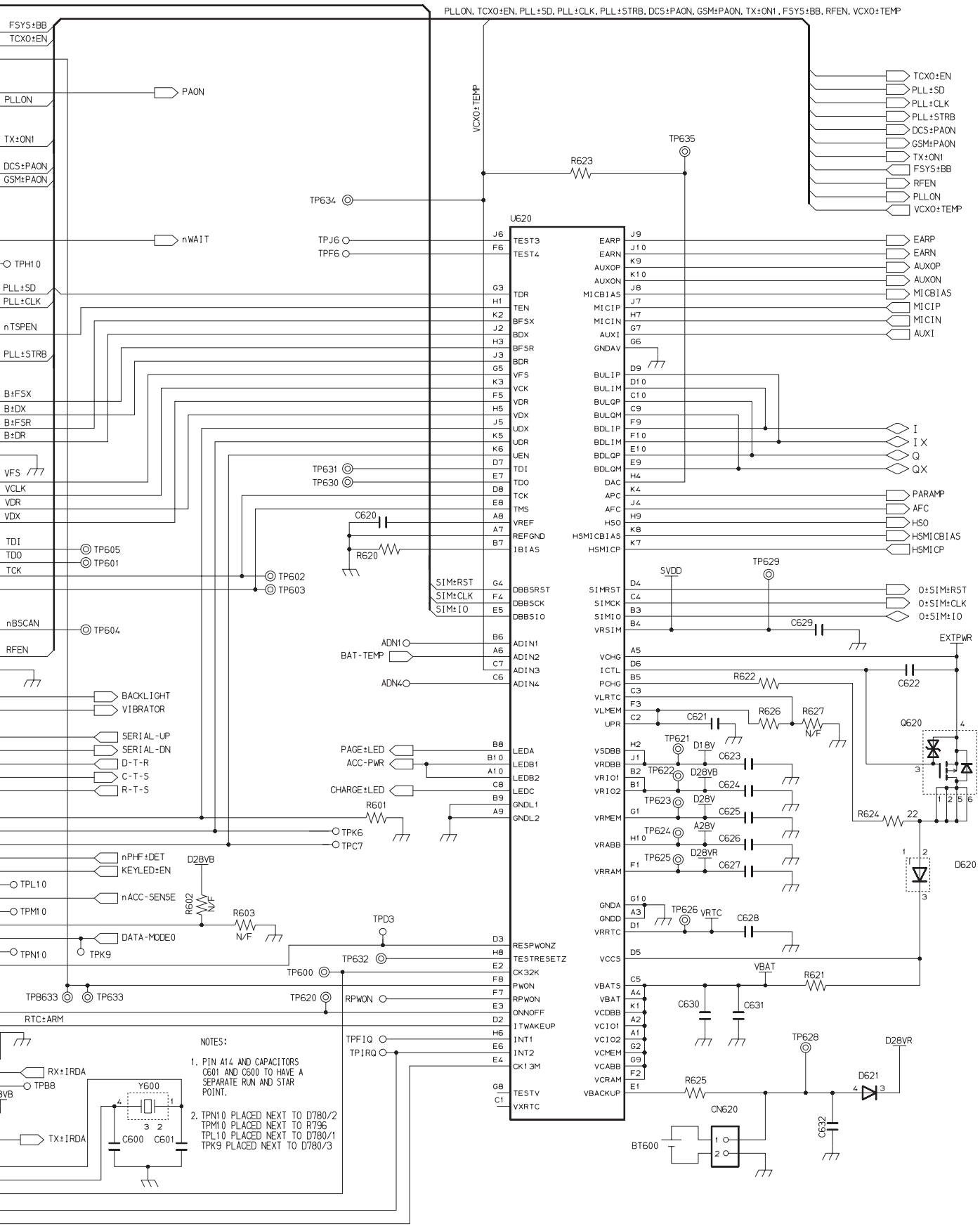


Figure 10.2: Circuit Diagram



rcuit Diagram - Baseband